

CLARK POINT, NEW BEDFORD, MASSACHUSETTS,  
BEACH EROSION CONTROL STUDY

---

LETTER  
FROM  
THE SECRETARY OF THE ARMY  
TRANSMITTING

A LETTER FROM THE CHIEF OF ENGINEERS, DEPARTMENT OF THE ARMY, DATED AUGUST 16, 1962, SUBMITTING A REPORT, TOGETHER WITH ACCOMPANYING PAPERS AND ILLUSTRATIONS, ON A COOPERATIVE BEACH EROSION CONTROL STUDY OF CLARK POINT, NEW BEDFORD, MASSACHUSETTS, AUTHORIZED BY THE RIVER AND HARBOR ACT, APPROVED JULY 3, 1930, AS AMENDED AND SUPPLEMENTED



SEPTEMBER 25, 1962.—Referred to the Committee on Public Works  
and ordered to be printed with five illustrations

# CLARK POINT, NEW BEDFORD, MASSACHUSETTS, BEACH EROSION CONTROL STUDY

---

## LETTER FROM THE SECRETARY OF THE ARMY TRANSMITTING

A LETTER FROM THE CHIEF OF ENGINEERS, DEPARTMENT OF THE ARMY, DATED AUGUST 16, 1962, SUBMITTING A REPORT, TOGETHER WITH ACCOMPANYING PAPERS AND ILLUSTRATIONS, ON A COOPERATIVE BEACH EROSION CONTROL STUDY OF CLARK POINT, NEW BEDFORD, MASSACHUSETTS, AUTHORIZED BY THE RIVER AND HARBOR ACT, APPROVED JULY 3, 1930, AS AMENDED AND SUPPLEMENTED



SEPTEMBER 25, 1962.—Referred to the Committee on Public Works  
and ordered to be printed with five illustrations

---

U.S. GOVERNMENT PRINTING OFFICE  
WASHINGTON : 1962

# CONTENTS

|   | Page |
|---|------|
| Letter of transmittal .....   | v    |
| Comments of the Bureau of the Budget .....                            | vi   |
| Comments of the Mayor of the City of New Bedford, Massachusetts ..... | vii  |
| Comments of the Commonwealth of Massachusetts .....                   | viii |
| Comments of the Department of the Interior .....                      | ix   |
| Report of the Chief of Engineers, Department of the Army .....        | 1    |
| Report of the Beach Erosion Board .....                               | 2    |
| Report of the Division Engineer:                                      |      |
| Syllabus .....  | 6    |
| Part I.—General:  |      |
| Authority .....   | 8    |
| Purpose .....   | 8    |
| Prior reports .....   | 8    |
| Location .....  | 8    |
| Population .....  | 8    |
| Description .....   | 9    |
| Statement of the problem .....  | 14   |
| Part II.—Factors pertinent to the problem:                            |      |
| Geomorphology .....   | 14   |
| Littoral materials .....  | 14   |
| Littoral forces .....   | 15   |
| Shoreline and offshore changes .....                                  | 15   |
| Protective structures .....   | 16   |
| Beach profiles .....  | 17   |
| Part III.—Analysis of the problem:                                    |      |
| Shore processes pertinent to the problem .....                        | 17   |
| Methods of correcting problem conditions .....                        | 17   |
| Design criteria .....   | 18   |
| Part IV.—Plans of protection and improvement:                         |      |
| West shore of Clark Point .....                                       | 19   |
| East shore of Clark Point .....                                       | 20   |
| Part V.—Economic analysis:  |      |
| General .....   | 20   |
| First costs .....   | 20   |
| Annual charges .....  | 21   |
| Benefits .....  | 21   |
| Justification .....   | 22   |
| Interests .....   | 22   |
| Apportionment of costs .....  | 22   |
| Coordination with local interests and other agencies .....            | 23   |
| Comments of local interests and other agencies .....                  | 23   |
| Responsibilities of local interests .....                             | 24   |
| Part VI.—Conclusions and recommendations:                             |      |
| Conclusions .....   | 25   |
| Recommendations .....   | 26   |

## APPENDIXES ACCOMPANYING THE REPORT OF THE DIVISION ENGINEER

| Appendix:   | Page |
|---|------|
| A. Description and composition of beaches .....   | 28   |
| B. Geology .....  | 37   |
| C. Littoral forces .....  | 38   |
| D. Shore structures .....   | 43   |
| E. Estimates of costs of improvements .....   | 50   |
| F. Estimates of benefits from improvements .....  | 54   |
| G. Report of the U.S. Fish and Wildlife Service .....   | 58   |
| H. Information called for by Senate Resolution 148, 85th Congress, adopted 28<br>January 1958 ..... | 61   |

ILLUSTRATIONS ACCOMPANYING THE REPORT OF THE DIVISION ENGINEER  
(Only Plate 4 not printed)

Plate:

- |  |                               |
|--|-------------------------------|
| 1-2. Survey map.....                         | Face blank p. 64—Nos. 1 and 2 |
| 3. Shoreline and offshore depth changes..... | Face blank p. 64—No. 3        |
| 4. Comparative profiles.                     |                               |
| 5-6. Plan of protection.....                 | Face blank p. 64—Nos. 4 and 5 |



# LETTER OF TRANSMITTAL



IN REPLY REFER TO:

DEPARTMENT OF THE ARMY  
WASHINGTON 25, D.C.

September 24, 1962

Honorable John W. McCormack

Speaker of the House of Representatives

Dear Mr. Speaker:

I am transmitting herewith a favorable report dated 16 August 1962, from the Chief of Engineers, Department of the Army, together with accompanying papers and illustrations, on a cooperative beach erosion control study of Clark Point, New Bedford, Massachusetts, authorized by the River and Harbor Act, approved 3 July 1930, as amended and supplemented.

The views of the Mayor of the City of New Bedford, Massachusetts, are set forth in the inclosed communication. In accordance with Public Law 85-624 the views of the Commonwealth of Massachusetts and the Department of the Interior are inclosed also.

The Bureau of the Budget notes that the Mayor of New Bedford states that the city is not in a position to meet the financial requirements of local participation at this time and that there is no indication in the letter as to when the city would be able to meet these requirements. Under these circumstances, therefore, the Bureau believes that authorization of this project would be premature.

The Bureau of the Budget advises that there would be no objection to the submission of the report to the Congress. It states that no commitment, however, can be made at this time as to when any estimate of appropriation would be submitted to finance the Federal share, if the project is authorized by the Congress, since this would be governed by the President's budgetary objectives as determined by the then prevailing fiscal situation. A copy of the letter from the Bureau of the Budget is inclosed.

Sincerely yours,

  
Cyrus R. Vance

1 Incl (dup)  
Rept w/accomp  
papers & illus

v Secretary of the Army

# COMMENTS OF THE BUREAU OF THE BUDGET

## EXECUTIVE OFFICE OF THE PRESIDENT

### BUREAU OF THE BUDGET

WASHINGTON 25, D. C.

September 14, 1962

Honorable Cyrus R. Vance  
Secretary of the Army  
Washington 25, D. C.

Dear Mr. Secretary:

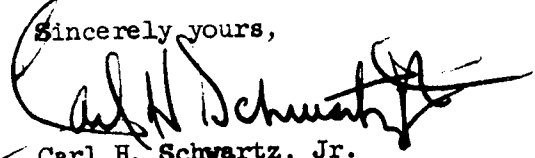
Assistant Secretary Schaub's letter of August 24, 1962, submitted the proposed report of the Chief of Engineers on a cooperative beach erosion control study of the shore of Clark Point, New Bedford, Massachusetts, authorized by section 2 of the River and Harbor Act, approved July 3, 1930, as amended and supplemented.

The Chief of Engineers recommends adoption of a project by the United States authorizing Federal participation, subject to certain conditions of local cooperation, by the contribution of Federal funds in the amount of one-third of the first costs of measures for restoration and protection of the shore at Rodney French Boulevard West Beach, New Bedford, Massachusetts. The work would involve widening approximately 1,600 feet of beach to a minimum berm width of 100 feet, raising the inshore end of the existing groin at Dudley Street and extending two existing groins. The cost of the project is estimated at \$180,000, with a Federal share of \$60,000. The estimated annual cost of maintenance, to be borne by local interests, is \$12,760. The benefit-cost ratio is stated to be 1.9.

We note that in a letter of August 10, 1962, the Mayor of New Bedford states that the city is not in a position to meet the financial requirements of local participation at this time. There is no indication in the letter as to when the city would be able to meet these requirements. Under these circumstances, therefore, the Bureau of the Budget believes that authorization of this project would be premature.

I am authorized by the Director of the Bureau of the Budget to advise you that there would be no objection to the submission of the report to the Congress. No commitment, however, can be made at this time as to when any estimate of appropriation would be submitted to finance the Federal share, if the project is authorized by the Congress, since this would be governed by the President's budgetary objectives as determined by the then prevailing fiscal situation.

Sincerely yours,

  
Carl H. Schwartz, Jr.  
Chief, Resources and  
Civil Works Division

COMMENTS OF THE MAYOR OF THE CITY OF NEW BEDFORD,  
MASSACHUSETTS



CITY OF NEW BEDFORD, MASSACHUSETTS  
EXECUTIVE DEPARTMENT  
OFFICE OF THE MAYOR

EDWARD F. HARRINGTON  
MAYOR

August 10, 1962

Department of the Army  
Office of the Chief of Engineers  
Washington 25, D. C.

Att: Robert C. Marshall, Colonel

Dear Colonel Marshall:

I am writing in reply to your communication dated June 14, 1962. The plans submitted are of course comprehensive and technical in nature. I call to your attention a letter dated April 12, 1961 to Colonel Karl F. Eklund in which my predecessor stated that the City of New Bedford was not, at that time, able to meet the financial condition of local cooperation required under the Federal Aid Program.

I regret that our position must be the same now as it was in 1961. We are in the process of undertaking participation in a rather far-reaching and expensive Hurricane Protection Barrier Project. I do, however, request that you seek authorization for this project from Congress, and I am certain that the City of New Bedford will, at some future date, have sufficient funds available to participate.

Sincerely,

Edward F. Harrington  
Mayor of New Bedford

EFH:msl

COMMENTS OF THE COMMONWEALTH OF MASSACHUSETTS



*The Commonwealth of Massachusetts*

*Water Resources Commission*

*73 Tremont Street, Boston 8*

OFFICE OF THE DIRECTOR

January 19, 1962

Lt. Gen. W. K. Wilson, Jr.  
Chief of Engineers  
Department of the Army  
Office of the Chief of Engineers  
Washington 25, D. C.

RE: ENG CW-PD

Dear Sir:

This office is in receipt of your letter of December 18, 1961, accompanied by the report of the Beach Erosion Board and of the District Engineer requesting the views of the Commonwealth in relationship to these reports as to fish and wildlife resources which may be involved on the proposed cooperative beach erosion control project at Clark Point in the City of New Bedford, Massachusetts.

It is proposed to restore and protect the shore at Rodney French Boulevard West Beach by widening approximately 1,600 feet of beach to a minimum width of 100 feet, raising the inshore end of the existing groin at Dudley Street and extending two existing groins 85 feet and 250 feet, respectively.

The comments of the Division of Fisheries and Game and the Division of Marine Fisheries have been secured by this Commission. Both agencies found that the proposed project would not have any adverse affect upon the fish and wildlife resources of the area. The agencies did recommend, however, that access for land-based fishermen be provided to the inshore end of the groins, and the stones forming the top of the groins be placed in such a manner as to minimize voids and allow a person to walk thereon.

The Water Resources Commission accordingly voted to transmit the comments of these two agencies to you as expressing the viewpoint of the Commonwealth insofar as fish and wildlife resources are involved in the proposed project.

Respectfully,

*Clarence I. Sterling, Jr.*  
Clarence I. Sterling, Jr.  
Director and Chief Engineer

CIS/n

COMMENTS OF THE DEPARTMENT OF THE INTERIOR



UNITED STATES  
DEPARTMENT OF THE INTERIOR  
OFFICE OF THE SECRETARY  
WASHINGTON 25, D. C.

April 3, 1962

Dear General Wilson:

This is in reply to your letter of December 18, 1961 requesting our comments on a cooperative beach erosion control study of Clark Point, New Bedford, Massachusetts.

The Fish and Wildlife Service advises that the recommended construction would have no significant adverse effects on fish and wildlife resources and would provide an opportunity for improving conditions for land-based fishermen.

Other interests of the Department would not be adversely affected by the proposed construction.

Sincerely yours,

Assistant Secretary of the Interior

Lt. General Walter K. Wilson, Jr.  
Chief of Engineers  
Department of the Army  
Washington 25, D. C.

**CLARK POINT, NEW BEDFORD, MASSACHUSETTS,  
BEACH EROSION CONTROL STUDY**

**REPORT OF THE CHIEF OF ENGINEERS, DEPARTMENT OF THE ARMY**

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
OFFICE OF THE CHIEF OF ENGINEERS  
WASHINGTON, D. C.

16 August 1962

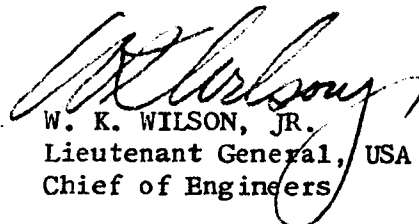
**SUBJECT:** Beach Erosion Control Report on Cooperative Study of Shore  
of Clark Point, New Bedford, Massachusetts

**TO:** THE SECRETARY OF THE ARMY

1. I submit for transmission to Congress a report with accompanying papers on a beach erosion study of the shore of Clark Point, New Bedford, Massachusetts, made by the Corps of Engineers in cooperation with the City of New Bedford under the provisions of section 2 of the River and Harbor Act approved July 3, 1930 as amended.

2. After full consideration of the report of the Division Engineer, the Beach Erosion Board recommends adoption of a project by the United States authorizing Federal participation, subject to certain conditions of local cooperation, by the contribution of Federal funds in amount of one-third of the first costs of measures for restoration and protection of the shore at Rodney French Boulevard West Beach, New Bedford, Massachusetts. The protective measures would be substantially in accordance with the following plan of the Division Engineer, with such modifications thereof as may be considered advisable by the Chief of Engineers: Widening approximately 1,600 feet of beach to a minimum berm width of 100 feet, raising the inshore end of the existing groin at Dudley Street and extending two existing groins. The presently estimated first costs are \$180,000, with a Federal share of \$60,000. Estimated annual maintenance costs of \$12,760 are to be borne by local interests.

3. After due consideration of these reports, I concur in the views and recommendations of the Board.

  
W. K. WILSON, JR.  
Lieutenant General, USA  
Chief of Engineers

# REPORT OF THE BEACH EROSION BOARD

CORPS OF ENGINEERS, U. S. ARMY  
BEACH EROSION BOARD  
WASHINGTON, D. C.

2 November 1961

SUBJECT: Beach Erosion Control Report on Cooperative Study of Clark Point,  
New Bedford, Massachusetts

TO: Chief of Engineers  
Department of the Army  
Washington, D. C.

1. This report is on a study of beach erosion made in cooperation with the City of New Bedford, Massachusetts under authority of section 2 of the River and Harbor Act approved July 3, 1930, as amended and supplemented. The purpose of the investigation was to determine the best method of restoration and stabilization of the city beaches along Rodney French Boulevard on the east and west sides of the Clark Point peninsula.

2. The City of New Bedford is located in Bristol County about 50 miles south of Boston. The shores studied are located on the east and west sides of Clark Point, a peninsula projecting into Buzzards Bay. The peninsula consists of glacial deposits. Beaches fronting the low banks are narrow. The total length of the study area is about 3 miles, including about 1 mile of frontage on the outer tip of the point occupied by Fort Rodman, a Federal military reservation.

3. New Bedford is a residential and industrial community with a permanent population of about 102,000. The shore of the study area is publicly owned except for about 0.1 mile on the east side of the point. The beaches are used for recreational purposes.

4. The tides in the study area are semi-diurnal. The mean and spring ranges are respectively 3.7 and 4.6 feet. The maximum tide of record, 14.2 feet above mean low water, occurred during the hurricane of September 1938. Tides in excess of 3 feet above mean high water occur about once in 2 years. The shores of the study area are exposed to waves up to about 6 feet high from the south generated in the limited fetch of Buzzards Bay. This portion of Buzzards Bay is cut off from the full fetch of the Atlantic Ocean by the Elizabeth Islands and Martha's Vineyard. Beach material has been supplied to the shore of the study area by northward littoral transport from erosion of Clark Point headland. Protection of the headland shore has reduced this supply with resultant erosion of the beaches.

5. The Division Engineer has considered the desires of the cooperating agency, has studied the sources and movement of the beach material, the changes in the shore line and the offshore bottom, the

effects of waves and storms, and has developed plans for restoration and stabilization of the beaches. He concludes that practicable plans for protection and improvement of the shores where recreational beaches are required comprise sand fills and groin construction, and that for shores where no fronting beach exists, stone revetment or rubble-mound wall construction is practicable. He has developed two alternative plans for protecting and improving Rodney French Boulevard West Beach; alternative No. 1 comprises raising the inshore end of an existing groin, lengthening two existing groins, and widening the beach by direct placement of sand fill; alternative No. 2 comprises raising the inshore end of the same existing groin, constructing three new intermediate groins, and widening the beach by direct placement of sand fill. He has also developed a plan comprising beach fill and two new groins for improving Rodney French Boulevard East Beach, and typical plans comprising stone revetment or rubble-mound wall for critical sections along Rodney French Boulevard West where no beaches exist. The estimated costs and evaluated benefits for the specific plans of improvement are as follows:

|                    | <u>West Beach</u> |                   | <u>East Beach</u> |
|--------------------|-------------------|-------------------|-------------------|
|                    | <u>Alt. No. 1</u> | <u>Alt. No. 2</u> |                   |
| First Costs        | \$180,000         | \$126,000         | \$97,000          |
| Annual Charges     | 20,200            | 18,500            | 10,000            |
| Benefits           | 38,925            | 35,440            | Not evaluated     |
| Benefit-cost Ratio | 1.9               | 1.9               | Not evaluated     |

The Division Engineer concludes that the work at the west beach is justified by evaluated benefits but that the public interest in projects for the east beach or other city-owned areas is insufficient to warrant Federal aid. He recommends a project providing for Federal participation in amount equal to one-third of the first costs of either alternative for the west beach, subject to certain conditions.

6. Local interests were informed of the findings and recommendations of the Division Engineer and invited to present additional information for the consideration of the Beach Erosion Board. No communications furnishing additional information were received as a result of the public notice.

#### VIEWS AND RECOMMENDATIONS OF THE BEACH EROSION BOARD

7. The Board concurs generally in the conclusions of the Division Engineer that either the groin extension plan or the new groin plan would be a practicable plan of improvement for Rodney French Boulevard West Beach, and that either plan is amply justified by prospective benefits. However, the Board notes that the State has expressed a preference for the groin extension plan. That plan provides greater beach area and additional benefits, making the greater cost of the plan incrementally justified. Therefore the Board concurs in the State's preference for that plan.



8. In accordance with existing statutory requirements, the Board states its opinion that:

a. The project for Rodney French Boulevard West Beach is amply justified by prospective benefits and it is advisable for the United States to adopt a project for restoring and protecting that shore;

b. The public interest involved in the proposed measures is associated with prevention of damages to publicly owned property and recreational benefits to the public; and

c. The shore is publicly owned, therefore, the share of the expense which should be borne by the United States is one-third of the first costs in accordance with the policy expressed by PL 826, 84th Congress.

9. The Board recommends adoption of a project by the United States authorizing Federal participation by the contribution of Federal funds in amount of one-third of the first costs of measures for the restoration and protection of the publicly owned shore at Rodney French Boulevard West Beach, New Bedford, Massachusetts, substantially in accordance with the groin extension plan of the Division Engineer, with such modifications thereof as may be considered advisable by the Chief of Engineers. The recommended plan comprises widening approximately 1,600 feet of beach to a minimum width of 100 feet by direct placement of suitable sand fill, raising the inshore end of the existing groin at Dudley Street, and extending two existing groins. The estimated first costs and Federal shares under the recommended project are respectively \$180,000 and \$60,000. Federal participation is recommended subject to the conditions that responsible local authorities:

a. Obtain approval by the Chief of Engineers, prior to commencement of work on the project, of detailed plans and specifications for the project and also the arrangements for prosecuting the work;


b. Furnish assurances satisfactory to the Secretary of the Army, that they will:

(1) Maintain the protective measures during their economic life, as may be required to serve their intended purpose;

(2) Control water pollution to the extent necessary to safeguard the health of bathers;

(3) Maintain continued public ownership of the shore upon which the Federal participation is based and its administration for public use during the economic life of the project.

FOR THE BOARD:

  
KEITH R. BARNEY  
Major General, USA  
President

At the time of adoption of this report the members of the Beach Erosion Board were:

Major General Keith R. Barney, President  
Dr. Thorndike Saville, State of New York  
Dean Morrrough P. O'Brien, State of California  
Dr. Lorenz G. Straub, State of Minnesota  
Brigadier General Thomas H. Lipscomb, U. S. Army  
Brigadier General Howard A. Morris, U. S. Army  
Brigadier General Arthur H. Frye, Jr., U. S. Army

U. S. ARMY ENGINEER DIVISION, NEW ENGLAND  
CORPS OF ENGINEERS  
424 TRAPELO ROAD  
WALTHAM 54, MASS.

NEDGW

11 May 1961

SUBJECT: Beach Erosion Control Report on Cooperative Study of  
Clark Point, New Bedford, Massachusetts

TO: Chief of Engineers  
Department of the Army  
Washington 25, D. C.

SYLLABUS

This study covers the shore between Woodlawn Street on the west side and Apponagansett Street on the east side of Clark Point, New Bedford, Massachusetts. Its purpose is to determine the best method of restoration and stabilization of the city beaches along Rodney French Boulevard on both sides of the peninsula.

The Division Engineer finds that loss of fill has occurred at a high rate and that existing groins do not hold an adequate protective and recreational beach along the west side of Clark Point. The Division Engineer finds that protection and improvement of Rodney French Boulevard West Beach can be effected by widening the beach by direct placement of sand fill and by either (1) enlarging and lengthening existing groins or (2) enlarging an existing groin and constructing additional groins.

A suitable plan for an additional public beach area along Rodney French Boulevard East has been developed for use by local interests.

The Division Engineer recommends that the United States adopt a project authorizing Federal participation by the contribution of Federal funds equal to one-third the cost of construction of protective works for the city beach along Rodney French Boulevard West, using either the Groin Extension Plan or the New Groin Plan as described below:

- a. Groin Extension Plan. - Protecting and improving approximately 1,600 feet of beach south from Dudley Street by widening to a minimum

100-foot width by direct placement of sand fill, raising the inshore end of the existing groin at Dudley Street and lengthening the two existing groins at and south of Valentine Street 250 and 85 feet, respectively.

b. New Groin Plan.- Protecting and improving approximately 1,600 feet of beach south from Dudley Street by widening to a minimum 100-foot width by direct placement of sand fill, raising the inshore end of the existing groin at Dudley Street and construction of three new impermeable groins 350, 340, and 375 feet long.

The total estimated amounts of Federal participation for first cost of construction are \$60,000 for the Groin Extension Plan and \$42,000 for the New Groin Plan.

# BEACH EROSION CONTROL REPORT ON COOPERATIVE STUDY

## OF CLARK POINT, NEW BEDFORD, MASSACHUSETTS

### PART I-GENERAL

1. Authority. - The study was made by the Corps of Engineers, United States Army, in cooperation with the City of New Bedford, Massachusetts, under authority of Section 2 of the River and Harbor Act approved July 3, 1930, as amended and supplemented. Formal application for the cooperative study dated March 5, 1958 was approved by the Chief of Engineers on April 1, 1958.

2. Purpose. - The purpose of the study as stated in the formal application, is to determine the best method of restoration and stabilization of the city beaches along Rodney French Boulevard on the east and west sides of the Clark Point peninsula.

3. Prior Reports. - There have been no prior beach erosion control reports covering the study area. The latest report on New Bedford and Fairhaven Harbor for navigation purposes, dated September 5, 1956, was unfavorable to further modification of the existing project. A Hurricane Survey Interim Report on New Bedford-Fairhaven was submitted by the Division Engineer on February 8, 1957 and was published as Senate Document 59, 85th Congress, 1st Session. The recommended project was authorized by the Flood Control Act of 1958. It consists of a stone barrier around the northerly end of Clark Cove, across New Bedford-Fairhaven Harbor entrance at Palmer Island and along the westerly end of the south shore of the Town of Fairhaven to protect shore areas north of the limits of this study. The project is now in the design stage leading to preparation of plans and specifications for construction.

4. Location. - The City of New Bedford is located in Bristol County, Massachusetts, about 50 miles south of Boston, and about 30 miles southeast of Providence, Rhode Island. It is on the north shore of Buzzards Bay, an arm of the Atlantic Ocean. The city has about 10 miles of shore line, 3 miles of which are covered by this report. The area is shown on United States Coast and Geodetic Survey Charts numbered 1210, 249, and 252; on United States Geological Survey and Army Map Service quadrangle of New Bedford, South, Massachusetts; and on Plates 1 and 2 of this report.

5. Population. - The population of New Bedford, according to the United States Census, reached a maximum of 121,217 in 1920. There has been a gradual decrease since that year to 109,189 in 1950 and 102,477 in 1960.

6. The City of New Bedford is highly industrialized and not greatly dependent upon tourist trade for its income. It therefore has little seasonal change in population. Beaches located in New Bedford are heavily used by its own population. The public beach at the East side of Clark Point reportedly attracts attendance from surrounding communities. The beaches under study are the only ones in the city available to the general public.

7. Description. - Clark Point is a peninsula of glacial deposit projecting about 2 miles southerly into Buzzards Bay. It is bounded on the west by Clark Cove and on the east by a larger cove at the entrance to New Bedford-Fairhaven Harbor. The northerly portion of the east shore of Clark Cove is a factory site with a steep stony shore protected by stone revetment. The study area begins in Clark Cove at Woodlawn Street, the southerly terminus of the factory site and extends to Apponagansett Street on the east side of the peninsula, a distance of about 3 miles. The shore is publicly owned except for about 323 feet along Rodney French Boulevard East between Aquidneck and Apponagansett Streets and about 250 feet south of and adjacent to Aquidneck Street. A well-developed public beach extends from Dudley Street to about Lucas Street along Rodney French Boulevard West, a distance of about 1,600 feet. This beach consists of short sand fillets at groins, the residue of past artificial placement of sand fill. Facilities consist of a large public bathhouse with concrete pavilion and a handicapped children's camp building. From Lucas Street southward about 3,500 feet to Fort Rodman, the beach is extremely narrow, gravelly and steep. In general, the high water line exists along the stone revetment. The city screening and pumping plant for storm and sanitary sewage is located about 1,800 feet northerly of Fort Rodman. Fort Rodman, a Federal military reservation, occupies the outer tip of Clark Point. It has about 5,000 feet of glacial till shore. At its northwesterly end there is about 1,000 feet of bluff approximately 15 to 20 feet high and the remainder of the shore is low. There is a narrow sandy beach about 300 feet long at the northeasterly property line. There are various forms of granite block walls or revetments in fair to poor condition along the shore. An earth filled pier about 800 feet long and the remains of a low groin are located on the east shore. The shore about 2,400 feet north of the northeast boundary of Fort Rodman is a new city beach built in 1959 by construction of 5 groins and placement of sand fill. Beach facilities consist of 4 large parking areas, a pavilion about 400 feet long, a comfort station and snack bar. North of the public beach to Aquidneck Street there are private residences on the seaward side of the shore road fronted by 3 small groins and a narrow sandy beach. The shore from Aquidneck Street to Apponagansett Street is coarse and boulder covered with the high water shore line at or close to revetment protecting the shore road. Detailed descriptions of the shore are given in Appendix A and the area is shown on Plates 1 and 2, and on Photos 1 through 6.

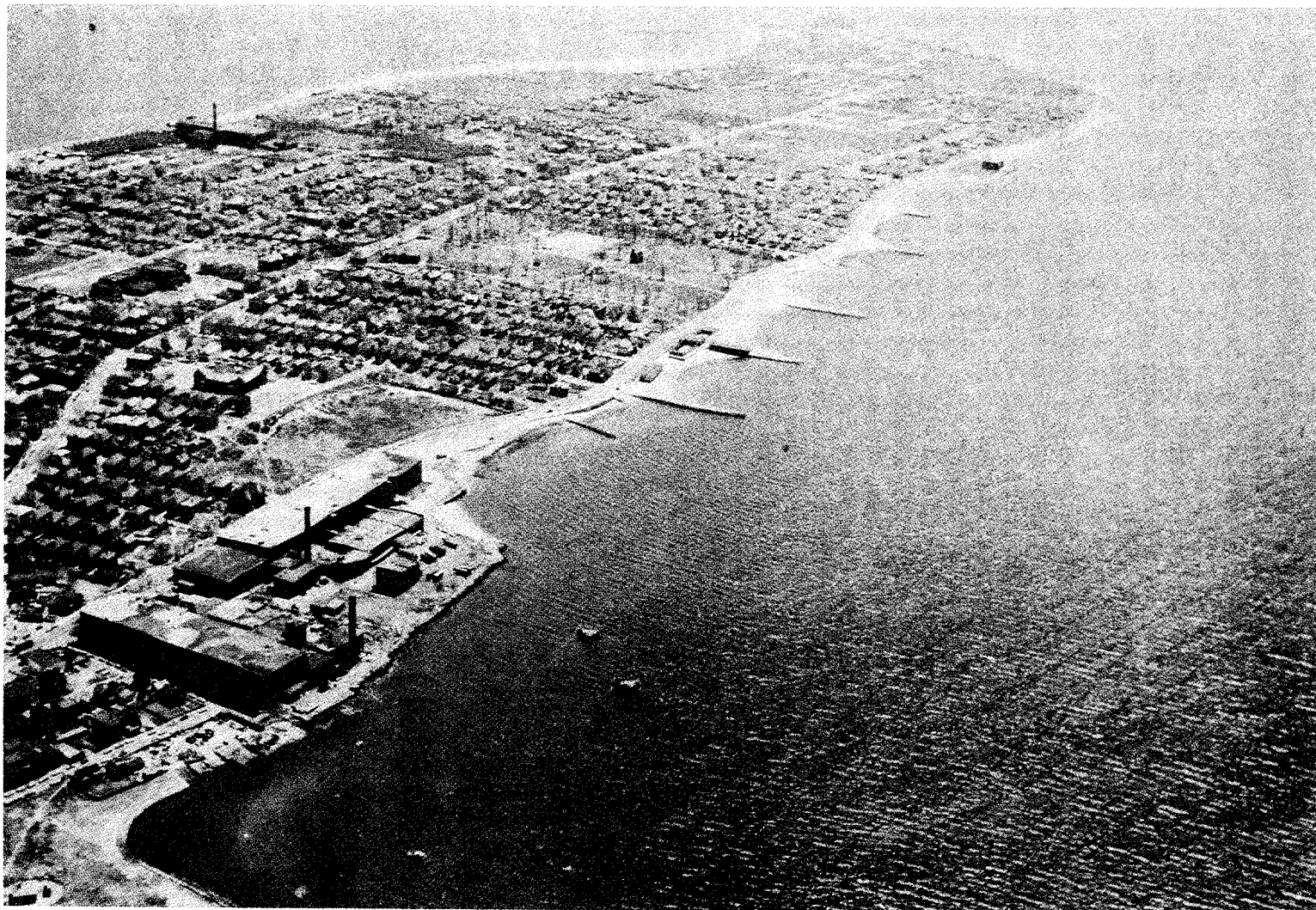


PHOTO 1. West Shore of Clark Point. May 6, 1960.

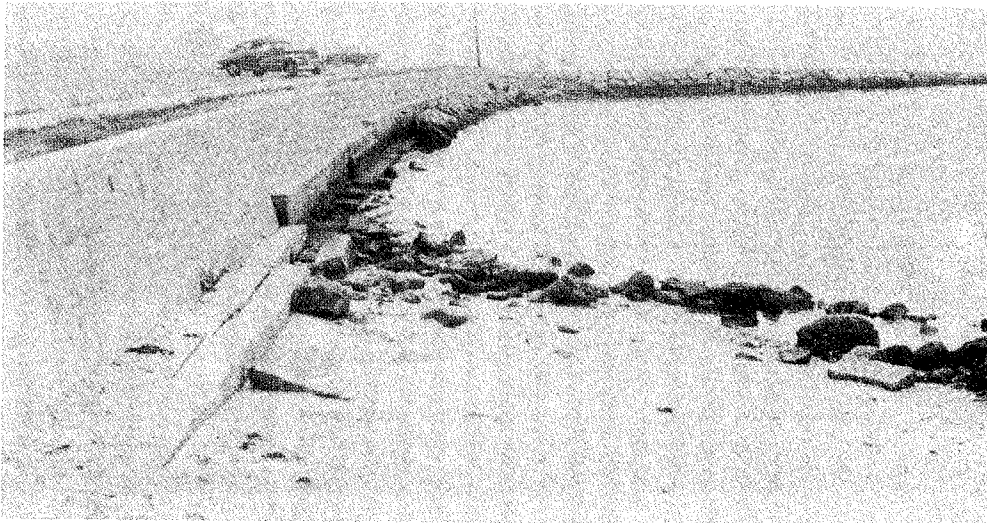


PHOTO 2. Rodney French Boulevard West Beach. August 11, 1959. Eroded shore south of Lucas Street.

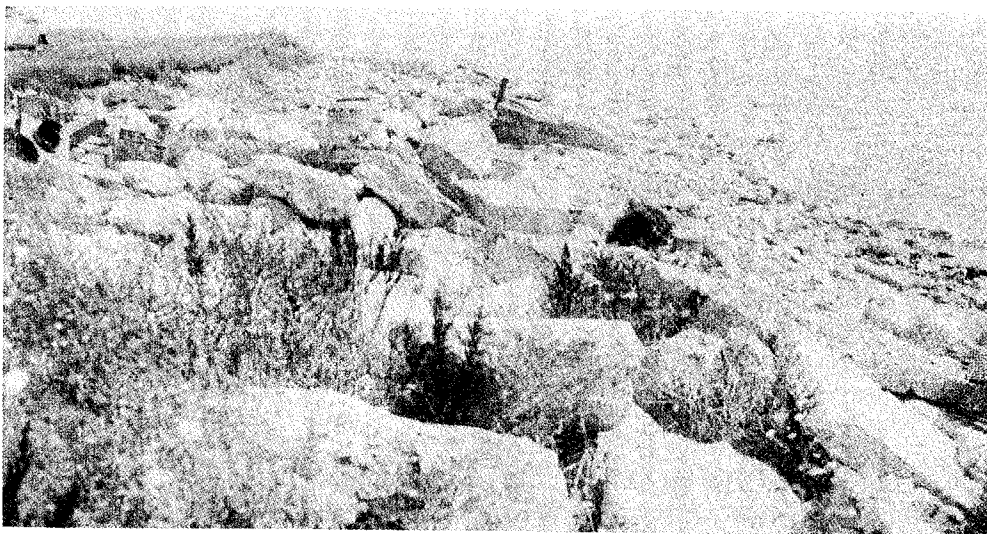


PHOTO 3. Fort Rodman West Shore. August 11, 1959. Erosion of bluff. Note exposed manhole.





PHOTO 4. Fort Rodman West Shore. August 11, 1959. Low shore area protected by riprap.



PHOTO 5. Rodney French Boulevard East Beach. August 11, 1959. Coarse shore south of Apponagansett Street.

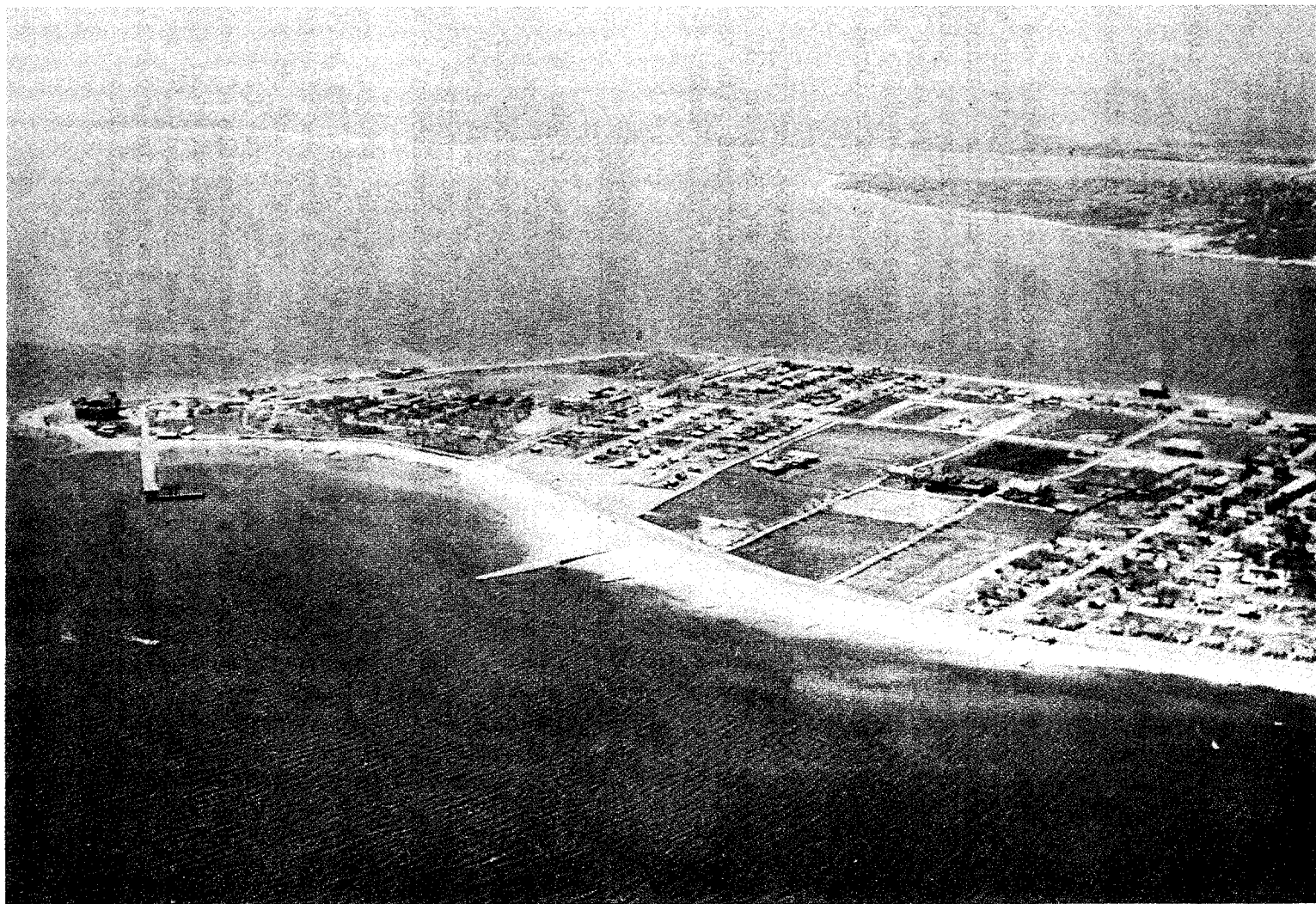


PHOTO 6. East Shore of Clark Point. May 6, 1960.

8. The principal source of possible pollution of the beach is the city sewage disposal plant. Both sewage and storm water are collected and pumped through the screening plant at Coral Street and carried offshore by a 60-inch pipe into Buzzards Bay about 3,300 feet southeasterly from the south tip of Clark Point. There is a possibility that during storms some of the pollution may be returned to Clark Point. However, the Health Department makes bacterial tests at frequent intervals to assure that pollution does not endanger the health of bathers. According to city officials the beach has not been closed because of pollution.

9. Statement of the Problem. - The problem is in general one of erosion of beaches and damage to structures protecting facilities and Rodney French Boulevard, which border the shore around the peninsula. The city has experienced difficulty in maintaining an adequate public bathing beach along Rodney French Boulevard West due to the rapid loss of beach material. The city desires public recreational beaches on both sides of the peninsula, and adequate works to most effectively protect its property.

10. No general public hearings were held. However, meetings were held with the Mayor, Superintendent of Parks and Beaches and the City Engineer of New Bedford. Contact was also maintained with the Division of Waterways, Massachusetts Department of Public Works.

## PART II - FACTORS PERTINENT TO THE PROBLEM

11. Geomorphology. - The shore line of the region is one of submergence characterized by bayhead beaches, tombolos and low rocky headlands. New Bedford-Fairhaven Harbor and the surrounding land area are founded on a single rock formation. The principal soils are glacial sands and gravels generally overlain by redeposited glacial sediments, and in the case of the harbor, an accumulation of mud.

12. Littoral Materials. - Materials available for littoral transport are generally limited to sands placed along the shore for artificial nourishment of the bathing beaches. Natural sources of supply have been largely eliminated by construction of seawalls and other works for protection of the peninsula and by erosion of the finer sandy materials from adjoining shore areas leaving a mantle of coarse material. Samples of beach material indicated the sand at mean high water ranges from 0.27 mm to 0.36 mm on the west beach and 0.24 mm to 0.29 mm on the east beach. On both beaches the sand is progressively coarser to mean low water. Analyses of samples of beach material and borings are shown on Plate 1.

13. Littoral Forces. - Detailed information on littoral forces is presented in Appendix C. General information is summarized below.

a. Tides. - Tides in the study area are semi-diurnal. Mean and spring ranges are 3.7 and 4.6 feet, respectively. The highest tide of record occurred during the hurricane of 21 September 1938 when the water elevation reached 14.2 feet above mean low water.

b. Winds. - Predominant winds blow from the westerly directions. Winds which have the greatest effect on the study area occur from the southwest through south to southeast. The maximum effective fetch is about 10 miles. A wind rose is shown on Plate 2.

c. Waves. - Waves approach the study area predominantly from southerly directions. Waves of about 6 feet in height attack the shore about once each year. Wave refraction diagrams indicate that crossing of wave trains due to the irregular hydrography cause a generally confused wave pattern. The most severe wave attack experienced in Clark Cove has been from the southwest quadrant.

d. Currents. - Tidal currents in the study area are insignificant. Principal currents are wave generated and they travel northerly along the shore. No current observations were made for this study.

14. Shoreline and Offshore Changes. - A map showing comparative positions of the high water shoreline and the 6, 12, 18 and 30-foot depth contours was prepared by the Beach Erosion Board based on old surveys of the United States Coast and Geodetic Survey for the years 1844-1845, 1895-1896 and 1935. A survey of the study area was run during 1959 by the Corps of Engineers, U. S. Army, locating the high water shoreline and elevations and soundings on beach profiles. The 1959 high water line was added to the comparative map prepared by the Beach Erosion Board and it is shown on Plate 3. Selected 1959 beach profiles with comparative positions of prior depths from the depth contour map are shown on Plate 4.

15. The principal changes in the position of the high water shore line appear to be the result of land reclamation by the construction of protective works and artificial filling or beach nourishment. The largest shore line change was effected by filling along the east half of the head of Clark Cove sometime after 1896 and the west half of the head of the cove about 1951 resulting in a seaward shore line movement of up to 350 feet. A varying seaward movement of the shore line of up to 300 feet was also effected along the east side of Clark Cove north of Woodlawn Street between 1896 and 1935. South of Woodlawn Street to Bellevue Street small amounts of seaward shore line movement in the form of fillets at the south side of groins occurred after 1935 up to

1959 as a result of construction of groins and placement of fill at the public bathing beach. Between Bellevue Street and Fort Rodman a seaward movement of the shore line in the vicinity of the screening plant at Coral Street of up to 200 feet was effected from 1844 to 1935 with little change since that date. Shore line changes along Fort Rodman have been small, the only appreciable change being recession of 50 to 75 feet along the east shore north of the pier from 1844 to 1896 followed by accretion of a similar amount between 1896 and 1935. Shore line changes along the east shore between Fort Rodman and Apponagansett Street were small from 1844 to 1935. During 1959, as a result of construction of groins and placement of fill to create a bathing beach, the east shore line between Fort Rodman and Bellevue Street was moved seaward about 50 to 100 feet.

16. Offshore depth changes along the west or Clark Cove shore consisted of deepening between 1845 and 1896, little change between 1896 and 1935 and irregular changes from 1935 to 1959 the latter principally shoaling in the vicinity of the 6-foot depth and deepening in the vicinity of the 12-foot depth. Offshore depth changes around the tip of Clark Point between 1845 and 1935 were irregular with no definite pattern of change. Profiles run during 1959 indicate that the principal change since 1935 consisted of shoaling and seaward movement of the 6, 12 and 18-foot contours. Along the east shore, depth changes were small and irregular from 1845 to 1935, generally consisting of deepening in the vicinity of the 6-foot depth and shoaling in the vicinity of the 12 and 18-foot depths. Beach profiles run during 1959 indicate that since 1935, the principal changes in the vicinity of the 6, 12 and 18-foot depths consisted of deepening.

17. Protective Structures. - Existing protective structures consist of seawalls, revetments, groins and sand fills. There is a concrete seawall behind most of the public beach area along the west shore. Stone groins along this area hold small fillets of sand. Stone revetment has been placed along the toe of much of the seawall and also as slope paving along the south part of this shore adjacent to Fort Rodman. The shore of Fort Rodman is largely protected with granite block, boulder or concrete rubble revetment. There is a solid fill stone pier on the east side of Fort Rodman and a 300-foot length of dry granite block wall north of the pier. The east shore north of Fort Rodman is protected by stone groins, beach fill and stone revetment.

17a. Existing groins, revetments and beach fills along the public beaches on the east and west sides of Clark Point are largely the result of construction starting in 1956. Construction between July and December 1956 consisted of placement of sand fill along the East Beach south of the city pavilion and construction of stone revetment and reconstruction or relocation of groins along the West Beach. During the period May - October 1958 three groins were constructed and sand fill was placed along the East Beach north of the pavilion and three existing groins

were lengthened and sand fill was placed along the West Beach between Oaklawn and Dudley Streets. Work accomplished along the East Beach from March to July 1959 consisted of construction of a groin at the end of the pavilion and placement of sand fill between the pavilion and Fort Rodman. Detailed descriptions of structures are included in Appendix D. Accurate records of losses of beach fill are not available. Losses have reportedly been high. During 1959, 32,000 cubic yards of fill were reportedly added to replace losses, about 2/3 along West Beach and 1/3 along East Beach. Indicated losses are 22,000 from West Beach and 11,000 from East Beach.

18. Beach Profiles. - Twenty beach profiles were run at selected locations around Clark Point as shown on Plates 1 and 2. They varied in length from about 1,600 to 3,000 feet and extended from the beach berm seaward to depths of 15 to 23 feet below mean low water. Plots of some of the profiles are shown on Plate 4. In general, the average slope along the west or Clark Cove shore landward of the 15-foot depth is steeper than around the south end of Clark Point and it is flattest along the east shore.

### PART III ANALYSIS OF THE PROBLEM

19. Shore Processes Pertinent to the Problem. - The loss of beach material and damages to shore structures are caused by wave action. Waves are generated in the Atlantic Ocean and in Buzzards Bay. Ocean waves enter Buzzards Bay from the southwest and are reduced considerably by refraction before reaching the study area. The fetches over which the largest waves are generated are those to the southeast clockwise around to the south southwest across Buzzards Bay to the Elizabeth Islands about 12 miles away. Waves from these southerly directions approach the study area with their crests oblique to the shore and upon breaking cause a predominant northward movement of littoral drift. Waves generated by northerly winds across the very short fetch across Clark Cove do not cause any appreciable reversal of movement of littoral drift to the south. Due to the obliquity with which waves break along the west shore of Clark Point, fillets of sand held by groins are small. Waves generated by northerly winds across the slightly longer fetch opposite the east shore of Clark Point, have caused some southward movement of littoral drift from the public bathing beach area onto the Fort Rodman shore north of the Fort Rodman pier. There is no significant natural source of supply of beach material. Littoral transport is therefore limited to materials placed directly on the beach for artificial nourishment.

20. Methods of Correcting Problem Conditions. - Widened beaches to protect the shore and Rodney French Boulevard and to provide additional area for recreational use can be created along the east and west shores of Clark Point north of Fort Rodman, as needed, by direct placement of sand fill. Reduction of the high losses of beach material from the

beaches can be effected by new groin construction or the lengthening of existing groins. Maintenance of seawalls where there is an inadequate width of protective beach can be effected by the use of stone revetment along the toe of the concrete wall bordering Rodney French Boulevard or by construction of a stone mound to replace the dry block wall at the city screening plant. The existing public bathing beach along the east shore can probably be maintained adequately by periodic nourishment to replace losses of beach material.

21. Design Criteria. - Proposed protective measures are designed to provide protection against ordinary wave conditions of comparatively frequent occurrence (at least once each year). They are not intended to provide complete protection in the event of hurricanes or great storms of infrequent occurrence, although even under these conditions some protection will be afforded.

a. Design Tide. - The design tide is the maximum expected to occur once each year. The elevation of design tide is 6.5 feet above mean low water.

b. Design Wave. - The design wave is the maximum significant wave expected to occur in the area once each year. The design wave is 6 feet in height. This maximum wave height is dependent on the depth of water at the location of the structure designed and will be less than 6 feet in shallow water which cannot support a 6-foot wave.

c. Groins. - The horizontal shore section should ordinarily have a top elevation not lower than the general height of berms of existing beaches and a length not less than the berm width of the anticipated beach. Experience has shown that the top elevation of the groins should be 9 to 10 feet above mean low water, the higher elevation for terminal groins. The intermediate sloped section should not be steeper than the slope of the existing foreshore, and should approximately equal the anticipated beach slope. The top elevation of the outer section should not be lower than 1 foot above the plane of mean low water. For stone construction, the minimum height of groins should be determined by the size of stone needed to resist movement by wave action with a minimum height of 3 feet. Groins should be sand tight and firmly anchored at their shore ends to prevent flanking. Groin lengths are generally determined by the shape and width of the beach fillet at the updrift side of groins. Cover stone sizes and side slopes for groins are computed using the U.S. Army Waterways Experiment Station formula. Blankets of spalls or crushed stone are used under stone groins or jetties to minimize settlement due to scour.

d. Sand Fills. - Berm elevations of proposed fills are based on those of existing beach berms. The minimum width of fills is based on widths found to afford protection in the area. Computed volumes of fills are based on slopes similar to existing slopes but fills can be



placed initially to a steeper slope and permitted to take a natural slope under wave action. Based on these criteria, berm elevations are approximately 8 feet above mean low water and beach widths above mean high water are generally not less than 100 feet with fill slopes of 1 on 11 to 1 on 20. Suitable sand for beach fills would have size and gradation characteristics similar to those of the sand components of the existing material on beaches. The replenishment of beach sand will vary for each area depending upon the average rate of erosion and the length of beach to be protected. For the purpose of detailed design of beach fills, the investigations of materials on the beaches and in proposed borrow areas given in this report should be supplemented prior to preparation of plans and specifications.

#### PART IV PLANS OF PROTECTION AND IMPROVEMENT

22. West Shore of Clark Point. - Two plans for protection and improvement of approximately 1,600 feet of Rodney French Boulevard West Beach between the groin at Dudley Street and the ramp at Lucas Street have been developed. One plan consists of reconstructing the inshore end of the Dudley Street groin to a higher elevation, lengthening the two existing groins south of Dudley Street and widening the beach by direct placement of sand fill. The other plan consists of reconstructing the inshore end of the Dudley Street groin to a higher elevation, constructing three additional groins with approximately the same length and one-half the spacing of existing groins and widening the beach by direct placement of sand fill. The fill would be placed generally to widen the beach above high water to a minimum width of 100 feet to provide protection against wave attack and additional beach area for recreational use. The groin reconstruction, construction or extensions would reduce losses of beach material. Widths of beach at the updrift side of groins would be dependent on the impounding capacity of the groins. Experience with existing groins indicated that this width will exceed that along the rest of the beach. Suitable material for beach fill from land borrow areas is available west and north of the harbor. Commercial sources are located in the Town of Dartmouth about five miles to the west and numerous undeveloped sources lie in that general area. Borrow areas exist in New Bedford - Fairhaven Harbor under a thin mantle of mud, in Clark Cove and inland in the Dartmouth area. The plans of protection and improvement are shown on Plate 5.

23. There is little or no protective beach fronting the sea wall and other protective works south of the ramp at Lucas Street. In some places erosion has lowered the level of the beach in front of the concrete sea wall, backfill has been lost by undermining and a part of the wall has buckled seaward and is in danger of complete failure. A dry stone wall fronting the city screening plant is in poor condition and backfill has been lost. Protection can be provided for the concrete wall by placement of blanket stone revetment along its toe or dumped riprap revetment in



front of it. Protection of the area in the vicinity of the city screening plant can be provided by replacing the existing dry stone wall with a stone mound. Details of a typical stone mound or revetments are shown on Plate 6.

24. East Shore of Clark Point. - A plan of protection and improvement of a portion of Rodney French Boulevard East Beach between Aquidneck Street and Apponagansett Street was developed for possible future use by local interests. The plan consists of widening the beach by direct placement of sand fill generally to a width of 100 feet at mean high water and construction of groins to retain and reduce losses of the fill. The improvement would provide additional recreational area. Protection benefits would be small since the boulevard along this area is already protected by stone revetment. The plan of protection and improvement is shown on Plate 6.

25. Existing protective and improvement works recently constructed by the State along the public bathing beach between Fort Rodman and a point between Ricketson and Bellevue Streets provide adequate recreational beach area and protection for present needs. No additional works are considered to be necessary here at the present time.

#### PART V ECONOMIC ANALYSIS

26. General. - Detailed estimates of costs are included in Appendix E and detailed estimates of benefits are included in Appendix F. First and annual costs were estimated for two alternate projects developed for Rodney French Boulevard West Beach and for one project for Rodney French Boulevard East Beach. Annual benefits were estimated for both West Beach projects. No benefits could be evaluated for the East Beach project since the adjoining existing public beach area at the east side of Clark Point is adequate for present and prospective recreational use and because existing structures are generally adequate for protection. Estimates are based on price levels prevailing during May 1961.

27. First Costs. - First costs of projects computed in detail in Appendix E are as follows:

| Location                           | Work Items  | Cost      |
|------------------------------------|---|-----------|
| Rodney French Boulevard            |   |           |
| West Beach                         |   |           |
| a. Groin Extension Plan            | Beach fill, enlargement or extension of groins                        | \$180,000 |
| b. New Groin Plan                  | Beach fill, enlargement of existing groin, construction of new groins | \$126,000 |
| Rodney French Boulevard East Beach | Beach fill and construction of groins                                 | \$ 97,000 |

28. Annual Charges. - Annual charges are based on the Federal and non-Federal share of the estimated costs of proposed projects. Detailed estimates are included in Appendix E. Interest has been computed at a rate of 2-5/8 percent for the Federal investment and 3½ percent for the non-Federal investment. An economic life of 50 years has been used in determining amortization charges. Maintenance requirements for beach fills have been estimated based on reported past losses. Estimated annual maintenance requirements are 14 cubic yards per linear foot for the West Beach reduced 50 percent to 7 cubic yards per linear foot by the proposed groin construction, enlargement or extension and 5 cubic yards per linear foot for the East Beach. Annual maintenance costs of groins were estimated as one percent of the first cost of construction. Estimated Federal and non-Federal investments and annual charges of projects are listed below.

|                        | Rodney French Boulevard West Beach |                | Rodney French Blvd |
|------------------------|------------------------------------|----------------|--------------------|
|                        | Groin Extension Plan               | New Groin Plan | East Beach         |
| Federal Investment     | \$ 60,000                          | \$ 42,000      | \$ 0               |
| Non-Federal Investment | 120,000                            | 84,000         | 97,000             |
| Total Investment       | \$ 180,000                         | \$ 126,000     | \$ 97,000          |
| Interest               | 5,900                              | 4,170          | 3,400              |
| Amortization           | 1,540                              | 1,100          | 720                |
| Maintenance            | 12,760                             | 13,230         | 5,880              |
| Total Annual Charges   | \$ 20,200                          | \$ 18,500      | \$ 10,000          |

29. Benefits. - The estimated benefits are based (1) on the recreational value of increased public beach space by the elimination of the overcrowding which attendance records show occurred during 1958 and 1959, (2) on prevention of direct damages to existing shore structures and the shore development and (3) on reduction of the experienced losses of beach fill. The recreational benefits have been evaluated as the minimum fee which patrons would be required to pay if the beach was a private enterprise. Direct damages prevented have been estimated based on general knowledge of existing conditions. The benefit from reduction of losses of beach fill is estimated as a saving of one-half of the cost of material previously replaced by the City assuming that groin construction will reduce losses by 50 percent. The annual benefits evaluated in detail in Appendix F are estimated as \$38,925 for the Groin Extension Plan and \$35,400 for the New Groin Plan.

30. Justification. - The estimated annual benefits, costs and ratio of benefits to costs are listed below. No benefits could be evaluated for the Rodney French Boulevard East Beach project since existing beach space and existing protective structures are adequate for present or prospective needs.

|                                | Annual<br>Benefits | Annual<br>Costs | Ratio of Benefits<br>to Costs |
|--------------------------------|--------------------|-----------------|-------------------------------|
| <u>Rodney French Boulevard</u> |                    |                 |                               |
| <u>West Beach</u>              |                    |                 |                               |
| a. Groin Extension Plan        | \$38,925           | \$20,200        | 1.93                          |
| b. New Groin Plan              | 35,440             | 18,500          | 1.92                          |
| <u>Rodney French Boulevard</u> |                    |                 |                               |
| <u>East Beach</u>              |                    |                 |                               |
|                                | ----               | 10,000          | ----                          |

31. Interests. - There is no Federal interest in any of the projects developed in detail since none of these shores are owned by the United States. Non-Federal public interest is defined as:

a. The benefits accruing to a State or political subdivision thereof as a landowner and,

b. The benefits accruing to the general public.

All estimated benefits are classified as non-Federal public benefits since the shores involved are non-Federal publicly-owned.

32. Apportionment of Costs. - Public Law 826, 84th Congress, established a policy of Federal aid for restoration and protection against erosion of the shores of the United States, its Territories and possessions. In accordance with this policy, the Federal share of the cost can equal but not exceed one-third of the first cost of construction, but not the maintenance of the project, the remainder of the cost to be paid by the State, municipality, or other political subdivision in which the project is located. Replacement of losses of beach fills is considered to be maintenance. The estimated apportionment of costs of the projects for Rodney French Boulevard West Beach is as follows:

|                           | : | Groin Extension Plan | : | New Groin Plan |
|---------------------------|---|----------------------|---|----------------|
| Federal Share of Cost     | : | \$ 60,000            | : | \$42,000       |
| Non-Federal Share of Cost | : | <u>\$120,000</u>     | : | <u>84,000</u>  |
| Total Cost                | : | \$180,000            | : | \$126,000      |

33. Coordination with Local Interests and Other Agencies. - Coordination has been maintained with the cooperating agency, the City of New Bedford, through the Mayor, the Superintendent of Parks and the City Engineer. The City was invited to comment on the findings of the study and to indicate the willingness and ability of local interests to comply with the conditions of local cooperation. Officials of the Division of Waterways of the Massachusetts Department of Public Works and the Commanding Officer of Fort Rodman have also been consulted. The views of the Federal and State Fish and Wildlife Agencies have been requested concerning aspects of the study pertaining to their interests.

34. Comments of Local Interests and Other Agencies. The Mayor of New Bedford did not furnish any specific comments concerning the proposed plans. The City Engineer, the engineering representative of the cooperating agency, concurred in the desirability of enlarging the West Beach groins and improving this beach for recreational use but he did not express any preference for either the Groin Extension or the New Groin Plan. He felt that a breakwater about 200 feet long should be constructed at West Beach out from the shore at the screening plant to protect the bathing beach area and seawalls to the north. He concurred in the use of riprap revetment for protection of the toes of sea walls. He did not consider that northward extension of the East Beach bathing area by fill placement was necessary and he questioned whether a beach fill could be retained in this location. He felt it was more desirable to maintain the existing East Beach than to develop a new beach area.

35. Engineers of the Division of Waterways of the Massachusetts Department of Public Works expressed a preference for the Groin Extension Plan over the New Groin Plan for protection and improvement of West Beach. They felt that the new groins would not be effective in holding a sand beach. In regard to the East Beach, they indicated a preference for enlarging the existing public beach area by placement of additional fill instead of extending the beach northward by groin construction and fill placement. It was their opinion that enlargement of the existing East Beach would result in increased public use, particularly by non-residents.

36. The Massachusetts Division of Fisheries and Game felt that nothing in the plans will have an adverse effect on fish and wildlife. It suggested that the value of the proposed work would be increased if some or all of the proposed groins could be constructed so that they could be used by fishermen, particularly in the case of the longer groins extending into the deeper water.

37. The United States Fish and Wildlife Service reported that insofar as that Bureau could determine there would be no adverse effects on the fish and wildlife resources of the area as a result of the proposed projects. It also reported that there is opportunity for improvement of conditions for land-based fishermen by constructing groins so as to permit easy and safe access for the public. The complete report of the U. S. Fish and Wildlife Service is included as Appendix G.

38. Responsibilities of Local Interests. - The cooperating agency, the City of New Bedford, was informed that local interests would be required to comply with the following conditions of local cooperation in order to obtain Federal participation in the cost of construction of the project at Rodney French Boulevard West Beach.

a. Obtain approval by the Chief of Engineers, prior to commencement of work, of detailed plans and specifications for the project and of arrangements for prosecuting the work.

b. Assure continued public ownership of the shore and its administration for public use during the economic life of the project.

c. Assure maintenance and repair during the economic life of the works as may be required to serve the intended purpose.

d. Assure that water pollution that would endanger the health of bathers will not be permitted.

The Mayor of New Bedford furnished the following statement:

"--the City of New Bedford has expressed its willingness to participate in this program at a previous date."

"Unfortunately, the City of New Bedford at this time, is unable to meet the financial condition of local cooperation required under the Federal Aid Program."

"However, the City would like to hold this program in abeyance so that we shall be able to participate in same at a later date."

In response to an inquiry concerning the willingness or ability of the State to assume any of the above conditions of local cooperation or the likelihood that the State would participate with the City of New Bedford in the construction of the proposed projects on its usual cost sharing basis, the Director of the Division of Waterways, Massachusetts Department of Public Works advised as follows: (1) The State would insist

that the City of New Bedford agree to meet conditions of local cooperation b, c and d above. (2) The Department would recommend this project to the State Legislature and seek from them 50% of the local interests cost providing the City of New Bedford had previously agreed to contribute the remaining 50%.

#### PART VI - CONCLUSIONS AND RECOMMENDATIONS

39. Conclusions. - The Division Engineer concludes that the following are practicable plans for protection and improvement of shore areas, all as shown on Plates 5 and 6.

a. Rodney French Boulevard West Beach. - Alternate No. 1 Groin Extension Plan. - Protecting and improving approximately 1,600 feet of beach south from Dudley Street by widening to a minimum 100-foot width by direct placement of sand fill, raising the inshore end of the existing groin at Dudley Street and lengthening the two existing groins at and south of Valentine Street 250 and 85 feet, respectively.

b. Rodney French Boulevard West Beach. - Alternate No. 2 New Groin Plan. Protecting and improving approximately 1600 feet of beach south from Dudley Street by widening to a minimum 100-foot width by direct placement of sand fill, raising the inshore end of the existing groin at Dudley Street and construction of three new impermeable groins 350, 340 and 375 feet long.

c. Rodney French Boulevard East Beach. - Protecting and improving approximately 950 feet of beach south from Apponagansett Street by widening to a minimum 100-foot width by direct placement of sand fill and construction of two impermeable groins 335 and 445 feet long.

40. The Division Engineer also concludes that concrete sea walls along Rodney French Boulevard West Beach which do not have a fronting protective beach can be adequately protected with stone revetment, that protection of the city screening plant area can be provided by replacement of the existing dry stone wall with a stone mound and that stone revetment or a stone mound are suitable for protection of localized shore and bluff areas at Fort Rodman which are subject to erosion.

41. The Groin Extension Plan and the New Groin Plan for protection and improvement of Rodney French Boulevard West Beach are both justified by evaluated benefits. The nature and amount of benefits are sufficient to warrant the maximum one-third participation by the

United States in the first cost of construction in accordance with the policy established by Public Law 826, 84th Congress. It is advisable for the United States to adopt a project authorizing Federal participation equal to one-third the first cost of whichever plan local interests may desire to construct.

42. No benefits could be evaluated for the proposed project at Rodney French Boulevard East Beach. Federal participation in this work is not warranted at the present time.

43. The public interest in protecting other city-owned areas is insufficient to warrant Federal aid.

44. Additional information on recommended and alternative projects called for by Resolution 148, 85th Congress, 1st Session, adopted 28 January 1958 is contained in Appendix H to this report.

45. Recommendations. - It is recommended that protective measures which may be undertaken by local interests based upon their determination of economic justification be accomplished in accordance with methods proposed and projects developed in this report.

46. It is recommended that the United States adopt a project authorizing Federal participation by the contribution of Federal funds in an amount equal to one-third the first cost of construction of either one of the projects described below and shown on Plate 5.

a. Rodney French Boulevard West Beach. - Alternate No. 1. Groin Extension Plan. - Protecting and improving approximately 1,600 feet of beach south from Dudley Street by widening to a minimum 100-foot width by direct placement of sand fill, raising the inshore end of the existing groin at Dudley Street and lengthening the two existing groins at and south of Valentine Street 250 and 85 feet, respectively.

b. Rodney French Boulevard West Beach. - Alternate No. 2. New Groin Plan. Protecting and improving approximately 1,600 feet of beach south from Dudley Street by widening to a minimum 100-foot width by direct placement of sand fill, raising the inshore end of the existing groin at Dudley Street and construction of three new impermeable groins 350, 340 and 375 feet long.

47. The recommended Federal participation is subject to the conditions that local interests will:

a. Obtain approval by the Chief of Engineers, prior to commencement of work of detailed plans and specifications for the project and of arrangements for prosecuting the work.

b. Assure continued public ownership of the shore and its administration for public use during the economic life of the project.

c. Assure maintenance and repair during the economic life of the works as may be required to serve the intended purpose.

d. Assure that water pollution that would endanger the health of bathers will not be permitted.

48. The estimated amount of Federal participation for initial construction in accordance with the foregoing recommendations is \$60,000 for the Groin Extension Plan and \$42,000 for the New Groin Plan.

14 Incls.  
8 Appendices  
6 Plates

SEYMOUR A. POTTER, JR.  
Brigadier General, USA  
Division Engineer



## APPENDIX A

### DESCRIPTION AND COMPOSITION OF BEACHES

1. General. - Detailed descriptive data and data on composition of the shore were obtained from field inspections of August 1959, and later field surveys during December 1959, ground and aerial photographs, topographic maps, coast charts, and from State and City officials. Descriptions are given beginning at the north end of the west shore, progressing southward to and around Fort Rodman, and thence northward along the east shore. Beach width, unless otherwise specified, is the usable width above mean high water. Elevations are referred to the plane of mean low water unless otherwise specified.

2. Profiles and Beach Samples. - A total of 20 beach profiles were run. They are shown in plan on Plates 1 and 2 and in elevation on Plate 4. Surface beach samples were taken at mean high water, mid-tide, and mean low water on profiles 1, 4, 7, 11, 16, and 18. Due to difficulty in the field, samples were not taken below mean low water. However, in connection with the design of the New Bedford-Fairhaven hurricane dike, borings were taken in New Bedford Harbor and in Clark Cove. Grain size analysis of the beach samples and of selected samples from the borings are shown in tabular form on Plate 1. A description of New Bedford Harbor bottom materials is in Appendix B.

3. Beach Slopes. - Generalized beach slopes were measured from the beach profiles and they are listed in Table A-1. Slopes are given from the landward to the seaward ends of the profiles, thus, 1/27 above -11.0 meaning 1 vertical over 27 horizontal above an elevation 11 feet below mean low water. Slopes flatter than 1/100 are listed as level.

TABLE A-1 BEACH SLOPES

| Profile No. | Slopes  |
|-------------|---|
| 1           | 1/27 above -11.0; level   |
| 2           | 1/20 above -13.5; level   |
| 3           | 1/19 above -13.0; level   |
| 4           | 1/19 above -6.0; 1/50 from -6.0 to -15.0; level   |
| 5           | Vertical above +5.0; 1/3.5 from 5.0 to 0.0; 1/45 from 0.0 to -16.5; level                           |
| 6           | 1/23 from 2.0 to -7.5; 1/48 from -7.5 to -14.0; level   |
| 7           | Vertical above 5.0; 1/20 from 5.0 to -14.0; 1/69 from -14.0 to -20.0; level                         |
| 8           | Almost vertical above 5.0; 1/20 from 5.0 to -20.0; level  |
| 9           | 1/14 from 6.0 to -21.0; level bottom of trough  |
| 10          | 1/10 above 4.0; 1/39 from 4.0 to -18.0; trough  |
| 11          | 1/60 from 4.0 to -11.0; level   |
| 12          | Almost vertical above 4.0; 1/50 from 4.0 to -15.0; 1/70 from -15.0 to -23.0                         |
| 13          | 1/8 from 4.0 to -5.0; level, 1/43 from -5.0 to -22.0; level   |
| 14          | 1/14 above 4.0; 1/45 from 4.0 to -26.0; level   |
| 15          | 1/10 above 0.0; 1/80 from 0.0 to -20.0  |
| 16          | 1/8 above 0.0; 1/46 from 0.0 to -9.0; 1/84 from -9.0 to -16.0; level                                |
| 17          | 1/14 from 6.0 to -7.0; 1/66 from -7.0 to -17.0; level   |
| 18          | 1/23 from 8.0 to 4.0; level   |
| 19          | Vertical above 7.0; 1/20 from 7.0 to -1.0; 1/94 from -1.0 to -10.0; 1/35 from -10.0 to -20.0; level |
| 20          | 1/11 from 4.5 to -3.0; 1/76 from -3.0 to -15.0; level   |

4. Detailed Descriptions. - Detailed descriptive information concerning the shore is included in the following subparagraphs. More detailed information concerning shore structures is contained in Appendix D.

a. Woodlawn Street to Dudley Street

- (1) Extent: 300 feet.
- (2) Ownership: Public, City of New Bedford.
- (3) Beach Use: Bathing and boating.
- (4) Public Facilities: Boat launching ramp near south end and life guard service.
- (5) Beach Width above High Water: 5 to 10 feet in front of wall except for small fillets at groins and boat ramp.
- (6) Composition of Shore: Fine to coarse sand. Coarse at south end with some gravel and cobble.
- (7) Protective Structures: Concrete sea wall throughout. Two stone groins, one about 200 feet long, opposite Woodlawn Street, one about 360 feet long opposite Dudley Street. Concrete boat ramp about 12 feet wide, 1 on 20 slope just north of the south groin. Structures generally in good condition.
- (8) Character of development: Recreational beach area.
- (9) Damage: Some raveling of stone on north side of south groin near midpoint - probably due to settlement.

b. Dudley Street to Bathhouse Pavilion

- (1) Extent: 525 feet.
- (2) Ownership: Public, City of New Bedford.
- (3) Beach Use: Bathing.
- (4) Public Facilities: Bathhouse, covered pavilion, camp for handicapped children, parking, lifeguard service.
- (5) Beach Width above High Water: 80 feet at fillet at north end adjacent to groin, 20 feet at handicapped children's camp, and 50 feet adjacent to pavilion.
- (6) Composition of Shore: Fine to coarse sand with fine gravel in wave zone, fine sand above wave zone.

(7) Protective Structures: Pavilion seaward of bathhouse with stone groin seaward of pavilion. Concrete sea wall behind the beach.

(8) Character of Development: Public bathing beach.

(9) Damage: Wading pool adjacent to pavilion undermined at seaward end. Scour at north end of groin.

c. Pavilion to Oaklawn Street Groin

(1) Extent: 1,400 feet.

(2) Ownership: Public, City of New Bedford.

(3) Beach Use: Bathing and boating.

(4) Public Facilities: Boat launching ramps just south of bathhouse and between groins. Parking along street and life guard service.

(5) Beach Width above High Water: About 50 feet (slightly wider at fillets) between pavilion and first groin to the south, and about 100 feet at south side of groin decreasing to 0 about 300 feet south.

(6) Composition of Shore: Generally fine sand mixed in some areas with coarse sand and fine gravel.

(7) Protective Structures: Stone groin about 250 feet long, located about 350 feet south of bathhouse. Stone groin about 850 feet south of above groin. Stone revetment about 500 feet long terminating at south groin. Concrete sea wall.

(8) Character of Development: Bathing beach throughout and public (Hazlewood) park, landward of Rodney French Boulevard.

(9) Damage: Sea wall damaged near south end of area.

d. Oaklawn Street Groin to North Side of Screening Plant Wall

(1) Extent: 1,400 feet.

(2) Ownership: Public, City of New Bedford.

(3) Beach Use: Bathing and boating.

(4) Public Facilities: Concrete boat launching ramps 50 feet south of Oaklawn Street groin, 300 feet south of groin, and at south end of area.

(5) Beach Width above High Water: 40 and 70 feet at short fillets at south sides of Oaklawn and Aquidneck Street groins, respectively. Little or no beach above high water elsewhere.

(6) Composition of Shore: Fine sand in fillets except for gravel fillet at boat launching ramp at south end of area.

(7) Protective Structures: Stone groin at Aquidneck Street about 180 feet long. Stone revetment along the toe of parts of the sea wall terminating at seaward end of boat ramp at south end of the area. Sea wall along most of shore, terminating north of south boat ramp.

(8) Character of Development: Recreational area with year round private residences landward of roadway.

(9) Damage: Some undermining of sea wall at northerly portion of area. In southern portion some spalling of concrete and damage to footings.

e. North Side of Screening Plant Wall to Fort Rodman

(1) Extent: 1,900 feet.

(2) Ownership: Public, City of New Bedford.

(3) Beach Use: Limited bathing, boating, and fishing.

(4) Public Facilities: None

(5) Beach Width above High Water: None. High water line on slope of revetment.

(6) Composition of Shore: Stone revetment to below high water.

(7) Protective Structures: Dry granite block wall around Screening Plant. Stone revetment along shore to the south.

(8) Character of Development: No development seaward of roadway. Private residences landward of roadway.

(9) Damage: Dry block wall at Screening Plant is damaged. Erosion behind low portion of wall.

f. Fort Rodman, Northwest Boundary to Tip of Clark Point

(1) Extent: 3,000 feet.

- (2) Ownership: United States.
- (3) Beach Use: None
- (4) Public Facilities: None
- (5) Beach Width above High Water: No sand beach.
- (6) Composition of Shore: No sand beach. Bluffs of glacial till with high gravel content and some sand.
- (7) Protective Structures: A concrete wall perpendicular to the shore at the north boundary. Dumped stone, rubble, granite block and boulder revetment along shore to the south. Structures in fair to poor condition.
- (8) Character of Development: Military (Reserve) Training Post.
- (9) Damage: Erosion of bluff behind or beneath rubble or stone block revetment.

g. Fort Rodman, Tip of Clark Point to Pier

- (1) Extent: 1,100 feet.
- (2) Ownership: United States.
- (3) Beach Use: None.
- (4) Public Facilities: None
- (5) Beach Width above High Water: No sand beach.
- (6) Composition of Shore: Glacial till bluffs.
- (7) Protective Structures: Dumped stone and boulder revetment to ruins of a stone groin about 200 feet south of pier. A solid earth filled pier with the remains of a timber pile wharf at its outer end. The structures are in poor condition.
- (8) Character of Development: Military Post.
- (9) Damage: Erosion behind revetment.

h. Fort Rodman, Pier to Northeast Boundary

- (1) Extent: 1,200 feet.
- (2) Ownership: United States.
- (3) Beach Use: Bathing beach for post personnel about 400 feet long near north end of area.
- (4) Public Facilities: Small frame bathhouse for post personnel.
- (5) Beach Width above High Water: About 25 feet at the fillet north of pier, 5 feet from about 100 feet north of pier to the bathing beach and 15 to 25 feet at the bathing beach.
- (6) Composition of Shore: Fine sand with some coarse sand in wave zone. Glacial till backshore.
- (7) Protective Structures: 300 feet of granite block wall north of the pier. Dumped stone and boulder revetment along the street north of the wall.
- (8) Character of Development: Military Post.
- (9) Damage: None visible.

i. Fort Rodman to City Pavilion

- (1) Extent: 1,200 feet.
- (2) Ownership: Public, City of New Bedford.
- (3) Beach Use: Public bathing beach.
- (4) Public Facilities: Parking areas, life guards and refreshment stands.
- (5) Beach Width above High Water: 150 feet at south end, 125 feet in center, and 250 feet at north end.
- (6) Composition of Shore: Fill composed of fine sand mixed with coarse sand at the south end.

(7) Protective Structures: Ruins of stone groin about 80 feet long at Fort Rodman property line. Stone groin about 180 feet long about 90 feet north of south end. Solid-fill pier about 350 feet long at the north end of the area. Stone groin about 250 feet long extends seaward from the end of the pier.

(8) Character of Development: Public bathing beach.

(9) Damage: None visible.

j. City Pavilion to North End of Public Beach

(1) Extent: 1,200 feet.

(2) Ownership: Public, City of New Bedford.

(3) Beach Use: Bathing.

(4) Public Facilities: Parking areas, lifeguards.

(5) Beach Width above High Water: 150-200 feet along 200 feet of shore north of pavilion. Generally 50 to 75 feet along the rest of the beach.

(6) Composition of Shore: Fine sand with some coarse sand and gravel near north end.

(7) Protective Structures: Concrete-capped stone sea wall behind the entire area. Three stone groins north of the pavilion. Sloping stone revetment about 60 feet in front of and parallel to the sea wall connecting the landward ends of the groins.

(8) Character of Development: Bathing beach.

(9) Damage: None visible.

k. North from Public Beach to Aquidneck Street

(1) Extent: 250 feet.

(2) Ownership: Private (3 lots).

(3) Beach Use: Private.



- (4) Public Facilities: None.
- (5) Beach Width above High Water: 30 to 50 feet.
- (6) Composition of Shore: Fine sand mixed with small amount of fine gravel.
- (7) Protective Structures: Three stone groins of rough construction.
- (8) Character of Development: Residential.
- (9) Damage: None visible.

1. Aquidneck Street to Apponagansett Street

- (1) Extent: 950 feet.
- (2) Ownership: City of New Bedford and private.
- (3) Beach Use: None.
- (4) Public Facilities: None.
- (5) Beach Width above High Water: None. High water line at revetment.
- (6) Composition of Shore: Coarse boulder covered shore.
- (7) Protective Structures: Revetment of dumped stone along the south half and smoothly placed stone along the north half.
- (8) Character of Development: Residential on the landward side of the street.
- (9) Damage: None visible.

## APPENDIX B

### GEOLOGY

1. The shore line of the region is one of youthful submergence characterized by bayhead beaches, tombolos, and low rocky headlands. New Bedford-Fairhaven Harbor and the surrounding land area are founded on a single rock formation, the Dedham Granodiorite, composed of a variety of igneous rock types in close and complex association with each other, further complicated by inclusions of ancient metamorphic rocks, into which the formation was intruded. The principal soils are glacial sands and gravels, generally overlain by redeposited glacial sediments and, in the case of the harbor, an accumulation of harbor mud. Principal mineral resources are sand and gravel, concrete aggregates and crushed stone.

2. Subsurface investigations were made during 1955 and 1956 by the U. S. Army Engineer Division, New England in connection with the study for the Hurricane Survey Interim Report on New Bedford-Fairhaven, Massachusetts, dated 8 February 1957. The locations and analyses of six borings in Clark Cove are shown on Plate 1. Other borings across New Bedford Harbor, and across the south end of Palmer Island, generally showed a layer of glacial till, ranging from 0 to 10 feet in thickness upon bedrock. Generally, where there is no till there is an accumulation of silty gravels and sands about 10 feet thick. There are silts and sands in a preglacial depression east of Palmer Island which are fine, granular, and high in quartz. These deposits have a maximum thickness of about 40 feet and are overlain by a layer about 15 feet thick of partly organic postglacial silts and sands. This is overlain by a veneer, two to three feet thick, of organic silt and sand with some shell content.

3. Dry borrow is available west and north of the harbor. Development of borrow pits west of the city, near the shore, is limited by the thin mantle and a high water table. However, commercial sources are located in the Town of Dartmouth, about five miles to the west, and numerous undeveloped sources lie in that general area.

4. The nature of the underlying rock throughout the area is such that almost any exposure suitable for quarrying would provide good revetment or groin material. There is a commercial quarry in the immediate vicinity, the Bluestone Quarry, which produces a well-indurated quartzitic granite gneiss, referred to locally as trap rock.

## APPENDIX C

### LITTORAL FORCES

1. Tides. - Tides in the study area are semidiurnal. The mean and spring ranges are 3.7 and 4.6 feet, respectively. There have been no tidal observations made for this study. However, analysis of United States Coast and Geodetic Survey records for Newport, Rhode Island indicates that tides rise above the plane of mean high water by approximately one foot or more 13½ times per year, by two feet or more 8 times per year and by three feet or more, once every 2½ years.

2. Design Tide. - The elevation of tide used for design purposes is the highest that occurs with a frequency of once each year. Based on the Newport, Rhode Island records it is estimated that an elevation of 6.5 feet above mean low water satisfies this criterion.

3. Storm Tides. - The design tide is based on that occurring frequently, assuming that some damage will occur during unusual storms such as hurricanes. Hurricane storm tides have exceeded these frequent tides by varying amounts. Maximum elevations, which occurred during the hurricanes of 21 September 1938, 14 September 1944, and 31 August 1954, were 14.2, 9.9, and 13.6 feet above mean low water. The design elevations used in the hurricane protection dike for New Bedford was 17.7 feet above mean low water.

4. Winds. - A wind rose, covering the period October 1949 - September 1959, is included on Plate 2. This rose, based on observations from 16 points of the compass, shows the per cent duration and average velocity of all winds and the number of hours duration of winds 32 miles per hour and over. Duration is plotted in per cent per degree of direction. Winds which affect the problem area occur from the southwest through south to southeast directions. Based on analysis of detailed data a wind velocity of 47 miles per hour was assumed for calculation of wave characteristics.

5. Waves. - A design wave height was determined using the method for wave generation in shallow water. The fetch is limited by the Elizabeth Islands south of the study area. Based on a fetch of 10 miles, still water elevation of 6.5 feet above mean low water, and a wind velocity of 47 miles per hour, a design wave of 6 feet in height was obtained. However, water depth may modify the design wave height at specific structures.

6. Wave Refraction Diagrams. - Wave refraction diagrams were prepared for waves approaching from south-southwest, south and southeast. In all cases a wave period of 5.2 seconds and a still water level of 6.5 feet above mean low water was used. The wave ray method was used for waves from the south and the wave crest method was used for the other two directions.

7. All three diagrams indicate confused wave patterns. The many shoals cause such abrupt bending of the wave fronts that a portion breaks away from the main front and continues in a diverse direction. The over-riding of one wave train over another is shown as a crossing of orthogonals and causes changes in wave height, and therefore energy, at the crossing point. Principal shoals are generally in a line south of Clark Point. Waves reaching the study area from the south are most affected, therefore, by refraction.

8. The outer orthogonals run, generally, parallel to the shore of Clark Point while the near shore orthogonals approach shore at an angle which would cause maximum material transport. Both conditions indicate high velocity littoral currents. These wave generated currents are probably the principal causative factor in the formation of the short length fillets at groins or other obstructions.

9. The diagrams show direction of wave travel and possible concentrations of energy but are not considered, in this case, to give satisfactory quantitative results on wave heights.

10. Currents. - The United States Coast and Geodetic Survey publication "Tidal Current Tables, Atlantic Coast of North America" show the currents at Clark Cove and New Bedford Harbor and approaches too weak and variable to be predictable. Therefore, the only currents of significance to the study are wave generated. Due to the limited direction of wave approach, these currents occur predominantly from the south. No current measurements were made in the study area.

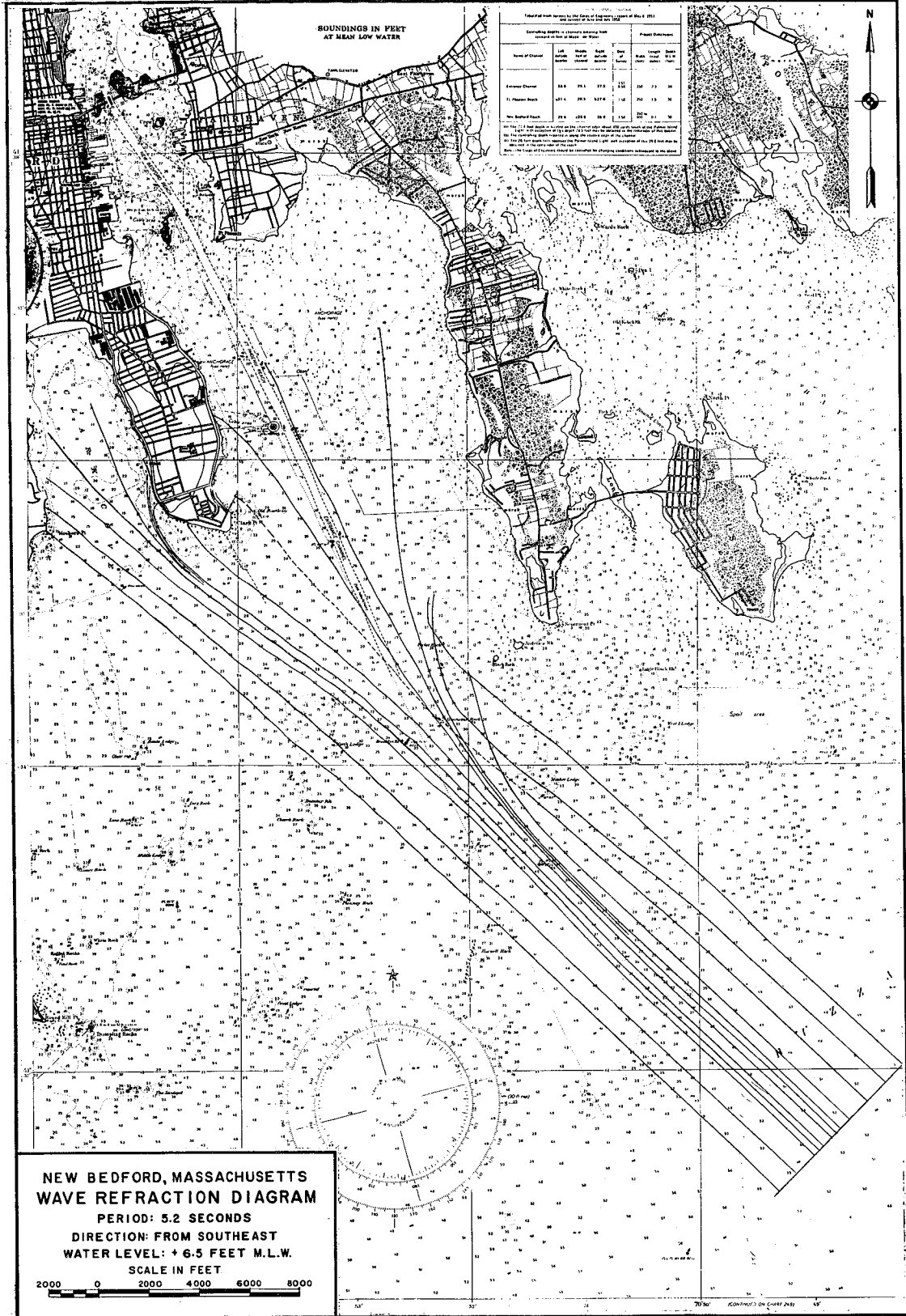


FIG. C-1

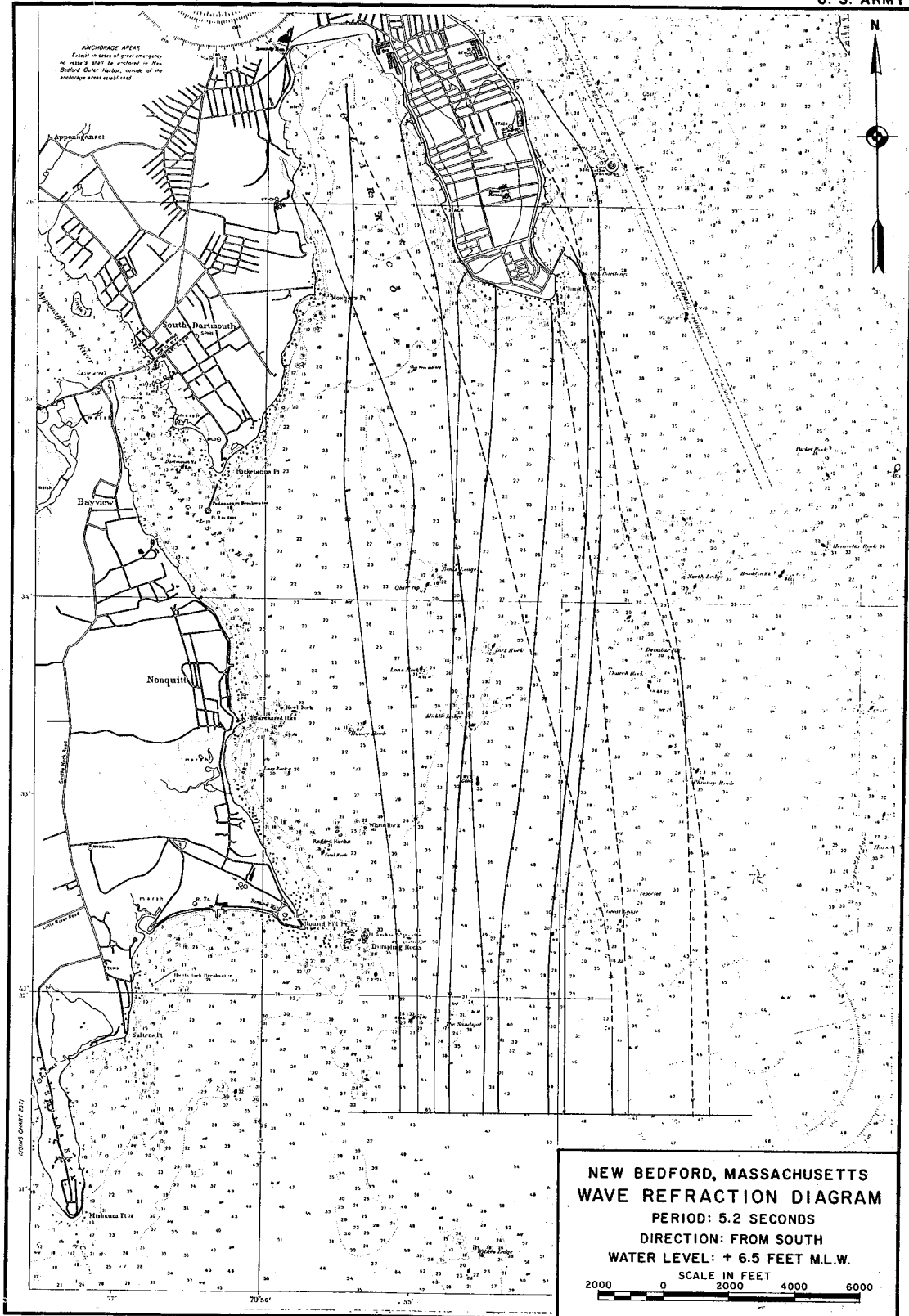


FIG. C-2



## APPENDIX D

### SHORE STRUCTURES

1. General. - Shore structures have been constructed by the State or the City of New Bedford except along part of the north end of the east shore and at Fort Rodman. Information concerning the structures was obtained by field inspections during 1959 and 1960, by field survey made in July and December 1959, by discussion with State and City officials, and from plans furnished by the State. The structures are described below beginning at the northwesterly end of the study area and proceeding around Clark Point to the northeasterly end. Beach fills are described in the concluding paragraph. All elevations are referred to the plane of mean low water. Descriptions do not include the groins listed below which were removed from the west shore during July - December 1956 by the State.

| <u>Location</u>                      | <u>Length (Feet)</u> |
|--------------------------------------|----------------------|
| Willard Street                       | 180                  |
| 320' South of Valentine Street       | 130                  |
| 670' North of Lucas Street           | 70                   |
| 300' North of Lucas Street           | 100                  |
| Lucas Street                         | 115                  |
| Calumet Street                       | 60                   |
| Capitol Street                       | 80                   |
| Between Dolphin and Bellevue Streets | 110                  |

The remains of a groin were buried also at this time at the east shore at Portland Street and the remains of a sea wall were removed between Fort Rodman and the pavilion, also along the east shore.

2. Clark Cove Sea Wall. - A concrete sea wall extends along Clark Cove from a point about 500 feet north of Woodlawn Street to the City Screening Plant at Coral Street, except where it is interrupted by the handicapped children's camp and the public bathhouse. The wall was constructed by the State and City. Length and elevation of the various sections are as follows:

| <u>Section</u>               | <u>Length in Feet</u> | <u>Elevation in Feet</u> |
|------------------------------|-----------------------|--------------------------|
| North end to Woodlawn Street | 530                   | 12.1 to 11.2             |
| Woodlawn to Camp             | 375                   | 11.1 to 10.6             |
| Camp to Bathhouse            | 110                   | 10.8 to 10.5             |
| Bathhouse to Screening Plant | 2,160                 | 11.1 to 9.9              |
| Along ramps                  | 150                   | 9.9 to 1.0               |

Total length . . . 3,325



3. Groin at Woodlawn Street. - There is a stone groin about 200 feet long opposite Woodlawn Street. It was constructed by the State during July - December 1956, replacing a city-built groin which was removed at that time. The groin has a top elevation of 6.6 feet at its inner end and slopes to 4.0 feet at its seaward end. It has a top width of 6 feet and side slopes of 1 on 1.5. It was built of stones ranging from 1/2 to 10 tons each with slope stones penetrating the beach surface about 2 feet.

4. Stone Revetment North of Dudley Street. - Stone revetment exists along the toe of 150 feet of sea wall north of the groin at Dudley Street. The revetment has a top elevation of 3.6 feet and is constructed of stones weighing 1/2 to 4 tons each, placed on a 1 on 2 slope.

5. Boat Ramp North of Dudley Street. - There is a concrete boat ramp sloping from the top of the sea wall to the beach, located about 60 feet north of the groin at Dudley Street.

6. Groin at Dudley Street. - There is a stone groin about 360 feet long opposite Dudley Street. It was constructed by the State during July - December 1956, replacing a city-built groin which was removed at that time. The outer 200 feet were added during May - October 1958. The groin has a top elevation of 8.5 feet at its inner end and slopes down seaward to 3.8 feet. It was built of stones weighing 1/2 to 10 tons each. It has side slopes of 1 on 2 and top width of 6 feet. Slope cover stones penetrate the beach surface 2 feet.

7. Handicapped Children's Camp (City). - There is a concrete building for handicapped children, 35 to 120 feet, located on piers on the beach between Dudley and Willard Streets.

8. Public Bathhouse (City). - There is a concrete bathhouse building, 35 by 280 feet, located on the beach opposite Valentine Street. A concrete sea wall extends between this building and the camp to the north. A sea wall extends around the bathhouse and the fronting pavilion. A concrete walk surmounts the wall around the bathhouse.

9. Public Pavilion (City). - This is a concrete structure, 45 feet wide, projecting 150 feet seaward from the center of the above bathhouse. The deck is of concrete and it is fully covered by a canopy. The elevation of the deck is 10.2 feet at its landward end and 9.2 feet at its seaward end.

10. Groin at the Public Pavilion. - A stone groin extends 165 feet seaward from the end of the public pavilion. It was constructed by the State during April - May 1958. It has a top width of 6 feet, side slopes of 1 on 2 and top elevation sloping seaward from 7.6 to 3.9 feet. It was built of stones weighing 1/2 to 10 tons.

11. Boat Ramp South of Public Bathhouse. - A concrete ramp adjacent to the south side of the bathhouse slopes onto the beach from the top of the sea wall.

12. Groin Between Valentine and Lucas Streets. - There is a stone groin about 380 feet south of the public bathhouse. It was constructed by the State during July - December 1956 to a length of about 150 feet replacing a City-built groin which was removed. The outer 200 feet were added during May - October 1958. The top elevation slopes seaward from 8.0 feet to 4.1 feet. The groin has a top width of 6 feet and side slopes of 1 on 2.

13. Stone Revetment North of Lucas Street. - Stone revetment with top elevation of 4.2 feet extends 180 feet along the toe of the sea wall north from the ramp about opposite Lucas Street. The State built 77 feet of this revetment during July - December 1956.

14. Boat Ramp Opposite Lucas Street. - There is a concrete boat ramp sloping from the top of the sea wall onto the beach located about opposite Lucas Street.

15. Stone Revetment, Lucas Street to Oaklawn Street. - Stone revetment extends from a point about 140 feet south of the Lucas Street ramp to a groin at Oaklawn Street, a distance of 165 feet. This revetment has a top elevation of 5.0 feet and a slope of 1 on 1.5. The State built 127 feet of this revetment during July - December 1956.

16. Groin at Oaklawn Street. - A stone groin was constructed during July - December 1956 by the State opposite Oaklawn Street. It replaced a City-built groin which was removed. The new groin has a length of 195 feet, a top elevation sloping seaward from elevation 8.8 feet to 4.2 feet, side slopes of 1 on 1.5, and top width of 5 feet.

17. Boat Ramp Near Oaklawn Street and Opposite Calumet Street. - There are two concrete ramps sloping down to the beach from the top of the sea wall, one about 40 feet south of the Oaklawn Street groin, the other opposite Calumet Street. The former was repaired and extended by the State during July - December 1956.

18. Stone Revetment South of Calumet Street. - There is a stone revetment with a top elevation of 5.1 feet along the toe of about 100 feet of sea wall, starting about 50 feet south of the Calumet Street ramp.

19. Groin Opposite Aquidneck Street. - There is a stone groin approximately 180 feet long, about opposite Aquidneck Street. It was built by the State during July - December 1956, replacing a former City-built groin which was removed. It has a top width of 5 feet, top elevation sloping seaward from 8.7 feet to 4.9 feet, and side slopes of 1 on 1.5.

20. Stone Revetment South of Aquidneck Street. - There are two sections of stone revetment, 170 and 190 feet long, located south of points 220 and 490 feet, respectively, south of the Aquidneck Street groin and running along the toe of the sea wall. The northerly section has a top elevation of 6.2 feet, the other varies north to south from 6.2 to 5.0 feet. They were constructed by the State during July - December 1956.

21. Boat Ramp North Side of Screening Plant. - There is a concrete ramp along the north side of the City Screening Plant property, sloping from elevation 10.6 at Rodney French Boulevard down to -0.9 feet on the beach. It was built by the State during 1957.

22. Stone Revetment at Ramp at Screening Plant. - There is a stone revetment along the north side of the City Screening Plant ramp, sloping seaward from top elevations of 5.1 feet down to 0.0. It was built by the State during 1957.

23. Screening Plant Wall and Mound. - There is a dry stone block wall fronting the Screening Plant. It has a total length of about 415 feet and top elevation varying between 7.8 and 9.6 feet. The wall is in fair to poor condition. There is a stone mound south of this wall for about 150 feet.

24. Stone Revetment South of Screening Plant. - There is placed sloping stone revetment along about 1,500 feet of shore from the stone mound south of the Screening Plant to the Fort Rodman property. The top elevation of the revetment varies from 10.0 to 11.3 feet. It is in generally good to fair condition. It was built by the State during 1956.

25. Fort Rodman Sea Wall. - There is a concrete sea wall, 105 feet long, normal to the shore line at the north limit of Fort Rodman. It is surmounted by a wire fence. The top of the wall slopes seaward from an elevation of 14.1 feet to 5.2 feet.

26. Stone Revetment Around Fort Rodman. - The shore of Fort Rodman is largely protected by revetment, generally granite blocks with some boulders and concrete rubble. The top elevation of the revetment varies from 16.0 feet at its northwest end to about 6.0 feet at the tip of Clark Point. The protective works are in fair to poor condition.

27. Fort Rodman Pier. - There is a solid fill pier 30 feet wide and 850 feet long on the east side of Fort Rodman inclosed by a granite block wall. The remains of an ell shaped timber pile wharf, 100 by 130 feet, exist at its outer end. The wall has a top elevation of 9.0 feet and the earth fill averages 8.7 feet. The structure is in poor condition.

28. Wall North of Fort Rodman Pier. - There is a dry granite block wall about 300 feet long extending northward from the Fort Rodman pier. The wall has a top elevation varying from 8.9 to 11.3 feet. It is in good condition.

29. Groin at Fort Rodman Property Line. - There is a stone groin, about 80 feet long, in poor condition along the north side of the Fort Rodman property line.

30. Groin North of Fort Rodman. - A stone groin 180 feet long, located about 90 feet north of the Fort Rodman property line, was built during 1958. Its top elevation slopes seaward from 8.7 to 4.0 feet. It is in good condition.

31. City Pavilion and Groin North of Portland Street. - There is a solid fill, pier-type, open deck pavilion 65 feet wide and 150 feet long, inclosed by a concrete wall and surfaced with bituminous material extending normal to Rodney French Boulevard north of Portland Street. Its top elevation varies from 9.0 to 9.4 feet. A stone groin extends 250 feet seaward from the end of the pavilion. The groin has a top elevation sloping seaward from elevation 10.4 to 5.6 feet. The groin was built by the State during March - July 1959.

32. Seawall and Stone Revetment North of the City Pavilion. - A stone masonry sea wall, capped with concrete, borders Rodney French Boulevard East for about 1,100 feet northerly from the pavilion. Its top elevation varies from 13.5 to 12.6 feet. There is sloping stone revetment about 60 feet seaward and parallel to the sea wall, constructed to a top elevation of 8.5 feet. The area between the revetment and wall was filled for automobile parking or park use. The wall, revetment, and fill were built by the State during May - October 1958. Work under this contract also included removal of the remains of four city groins from the same area.

33. Stone Groins and Fill North of the City Pavilion. - Three stone groins were constructed and beach fill placed north of the pavilion by the State during May - October 1958. The groins 220, 520, and 790 feet north of the pavilion extend 270, 195, and 150 feet, respectively, seaward from the sloping revetment described in the previous paragraph. From south to north the groins have top elevations sloping seaward from elevations 9.1 to 3.9 feet, 8.0 to 3.9 feet, and 8.0 to 4.3 feet. They were built with top width of 6 feet and side slopes of 1 on 2. Slope cover stones were embedded 2 feet into the beach. The beach fill was placed from the pavilion to 300 feet north of the most northerly groin with a horizontal berm 60 to 105 feet wide at elevation 7.75 feet in front of the stone revetment, then sloping seaward at a specified slope of 1 on 15.

34. Groin Between Ricketson and Bellevue Streets. - There is a stone groin in poor condition opposite a boat ramp at the north limit of the fill placed during May - October 1958.

35. Boat Ramp Near Bellevue Street. - There is a concrete boat ramp sloping onto the beach in the vicinity of Bellevue Street from the north end of the seawall described in Paragraph 32 above. A small low deteriorated stone groin exists along the south edge of the ramp.

36. Groin Between Bellevue and Aquidneck Streets. - There is a stone groin fronting private property between Bellevue and Aquidneck Streets. It has a length of about 100 feet and a top elevation of 4.5 feet. The groin is in fair condition.

37. Concrete Wall Between Boat Ramp and Aquidneck Street. - A concrete sea wall about 235 feet long extends north between the boat ramp and Aquidneck Street in front of 3 private residences. It has a top elevation of 11.2 feet.

38. Groin at Aquidneck Street. - There is a groin of rough stone construction about 130 feet long about opposite Aquidneck Street. The groin varies in top elevation from 5.5 to 4.5 feet.

39. Revetment Between Aquidneck Street and Pumping Station. - A grouted placed stone revetment about 330 feet long extends from a point 520 feet north of Aquidneck Street to within 65 feet of the pumping station at Apponagansett Street. South of and in front of this revetment are scattered boulders along with probable remains of old groins.

40. Beach Fills - East and West Beaches. - Beach fills were placed along the East and West Beaches by the State as shown below:

| <u>Location</u>  | <u>Period</u>      | <u>Quantity (Cu.Yd.)</u> |
|--|--------------------|--------------------------|
| East Beach from Fort Rodman to the City pavilion and in a small area between the bath-houses at the West Beach | July-December 1956 | 12,600                   |
| East Beach between the City pavilion and Bellevue Street and West Beach between Oaklawn and Dudley Streets     | May-October 1958   | 106,000                  |
| East Beach from the City pavilion to Fort Rodman   | March-July 1959    | 77,000                   |

The fill placed at the East Beach during 1956 had a specified horizontal berm with elevation 10.0 and a varying width of 25 feet or more. The fill placed during May-October 1958 was specified to have a berm elevation of 7.75, with width of 60-105 feet, and slope of 1 on 15 along the East Beach and a berm elevation of 7.0 with berm generally 50 feet wide, increasing to 100 feet from the pavilion to Dudley Street, and slope of 1 on 15 along the West Beach. The fill placed along the East Beach during March - July 1959 had a specified berm elevation of 7.75 feet, with width of about 125 feet from the street curb and slope of 1 on 15. No surveys are available to determine rates of losses of the fills. Losses have reportedly been high. The New Bedford city engineer reported that 32,000 cubic yards of fill were added during 1959 to replace losses, about 2/3 along the West Beach and 1/3 along the East Beach.

## APPENDIX E

### ESTIMATES OF COSTS OF IMPROVEMENTS

1. An economic life of 50 years has been used in determining amortization charges. An annual interest rate of  $2\frac{5}{8}$  per cent has been used for Federal charges and 3.5 per cent for non-Federal charges. First costs of beach fills are based on dry borrow and hauling by trucks. Annual maintenance requirements for beach fills are estimated on the basis of reported replacement during 1959 of losses of 22,000 cubic yards for West Beach and 11,000 cubic yards for East Beach. Estimates of annual losses on this basis are, approximately, 14 cubic yards per linear foot for West Beach and 5 cubic yards per linear foot for East Beach. It is estimated that the proposed groin construction at West Beach will reduce annual losses 50 per cent to about 7 cubic yards per linear foot. It is estimated that annual losses at the proposed East Beach project will be the same as at the existing public beach adjacent to this area or 5 cubic yards per linear foot.

2. Rodney French Boulevard West Beach. - Two plans of protection and improvement have been developed. One, referred to as the Groin Extension Plan, consists of extension or enlargement of existing groins and beach widening by direct placement of sand fill. The other, referred to as the New Groin Plan, consists of construction of additional new groins, enlargement of one existing groin and beach widening by direct placement of sand fill.

## Groin Extension Plan

### a. First Cost (Federal and Non-Federal)

|   |               |
|---|---------------|
| Groin extensions and enlargement, 5,500 tons<br>stone @ \$12.00 | \$66,000      |
| Sand fill, 68,000 cu. yds @ \$1.10                              | 74,800        |
| Contingencies   | <u>20,200</u> |
| Subtotal  | \$161,000     |
| Engineering and Design  | <u>6,000</u>  |
| Subtotal  | \$167,000     |
| Supervision and Administration                                  | <u>13,000</u> |
| Total First Cost  | \$180,000     |
| Federal Share of Cost (1/3)                                     | 60,000        |
| Non-Federal Share of Cost (2/3)                                 | 120,000       |

### b. Annual Charges

#### Federal Investment

|   |              |
|---|--------------|
| Project Cost                            | \$ 60,000    |
| Preauthorization Study Cost             | <u>2,000</u> |
|   | 5,000        |
| Total Federal Investment                | 62,000       |
| Interest ( $.02625 \times 62,000$ )     | 1,760        |
| Amortization ( $.00989 \times 62,000$ ) | <u>610</u>   |
| Total Federal Annual Charges            | 2,440        |
|   | 2,420        |

#### Non-Federal Investment

|                              |              |
|------------------------------|--------------|
| Project Cost                 | 120,000      |
| Preauthorization Study Cost  | <u>2,000</u> |
|                              | 5,000        |
| Total Non-Federal Investment | \$127,000    |



|                                    |   |              |
|------------------------------------|---|--------------|
|                                    | 7 | 4450         |
| Interest (.035 x 122,000) 7        |   | \$ 4,270     |
| Amortization (.00763 x 122,000)    |   | 930          |
| Maintenance                        |   | 970          |
| Sand Fill, 11,000 cu. yds @ \$1.10 |   | 12,100       |
| Groins - 55 tons @ \$12.00         |   | 660          |
|                                    |   | <hr/> 18,180 |
| Total Non-Federal Annual Charges   |   | \$17,960     |
|                                    |   | 600          |
| Total Annual Charges               |   | 20,200       |

### New Groin Plan

#### a. First Cost (Federal and Non-Federal)

|  |               |
|--|---------------|
| Groin construction and enlargement, 9,400 tons<br>stone @ \$6.00 | \$56,400      |
| Sand fill, 36,000 cu. yds @ \$1.10                               | 39,600        |
| Contingencies  | <u>15,000</u> |
| Subtotal   | \$111,000     |
| Engineering and Design   | <u>6,000</u>  |
| Subtotal   | \$117,000     |
| Supervision and Administration                                   | <u>9,000</u>  |
| Total First Cost   | \$126,000     |
| Federal Share of Cost (1/3)                                      | \$ 42,000     |
| Non-Federal Share of Cost (2/3)                                  | 84,000        |

#### b. Annual Charges

##### Federal Investment

|                                |              |
|--------------------------------|--------------|
| Project Cost                   | \$ 42,000    |
| Preauthorization Study Cost    | <u>2,000</u> |
| Total Federal Investment       | \$ 44,000    |
| Interest (.02625 x 44,000)     | 1,160        |
| Amortization (.00989 x 44,000) | <u>440</u>   |
| Total Federal Annual Charges   | \$ 1,600     |

Non-Federal Investment

Project Cost \$ 84,000  
Preauthorization Study Cost 2,000

Total Non-Federal Investment \$ 86,000

Interest (.035 x 86,000) 3,010  
Amortization (.00763 x 86,000) 660

Maintenance  
Sand fill, 11,000 cu.yds @ \$1.10 12,100  
Groins 94 tons @ \$12.00 1,130

Total Non-Federal Annual Charges \$ 16,900

Total Annual Charges 18,500

3. Rodney French Boulevard East Beach.- The plan of protection and improvement consists of construction of groins and beach widening by direct placement of sand fill.

a. First Cost (Non-Federal)

Groin construction, 5,900 tons  
stone @ \$6.00 \$ 35,400

Sand fill, 36,000 cu.yds @ \$1.10 39,600

Contingencies 11,000

Subtotal \$ 86,000

Engineering and Design 4,000

Subtotal \$ 90,000

Supervision and Administration 7,000

Total First Cost \$ 97,000

b. Annual Charges

Interest (.035 x 97,000) 3,400  
Amortization (.00763 x 97,000) 720

Maintenance  
Sand fill, 4,800 cu.yds @ \$1.10 5,280  
Groins, 60 tons @ \$10.00 600

TOTAL ANNUAL CHARGES \$ 10,000

18180  
2420  
20600

## APPENDIX F

### ESTIMATES OF BENEFITS FROM IMPROVEMENTS

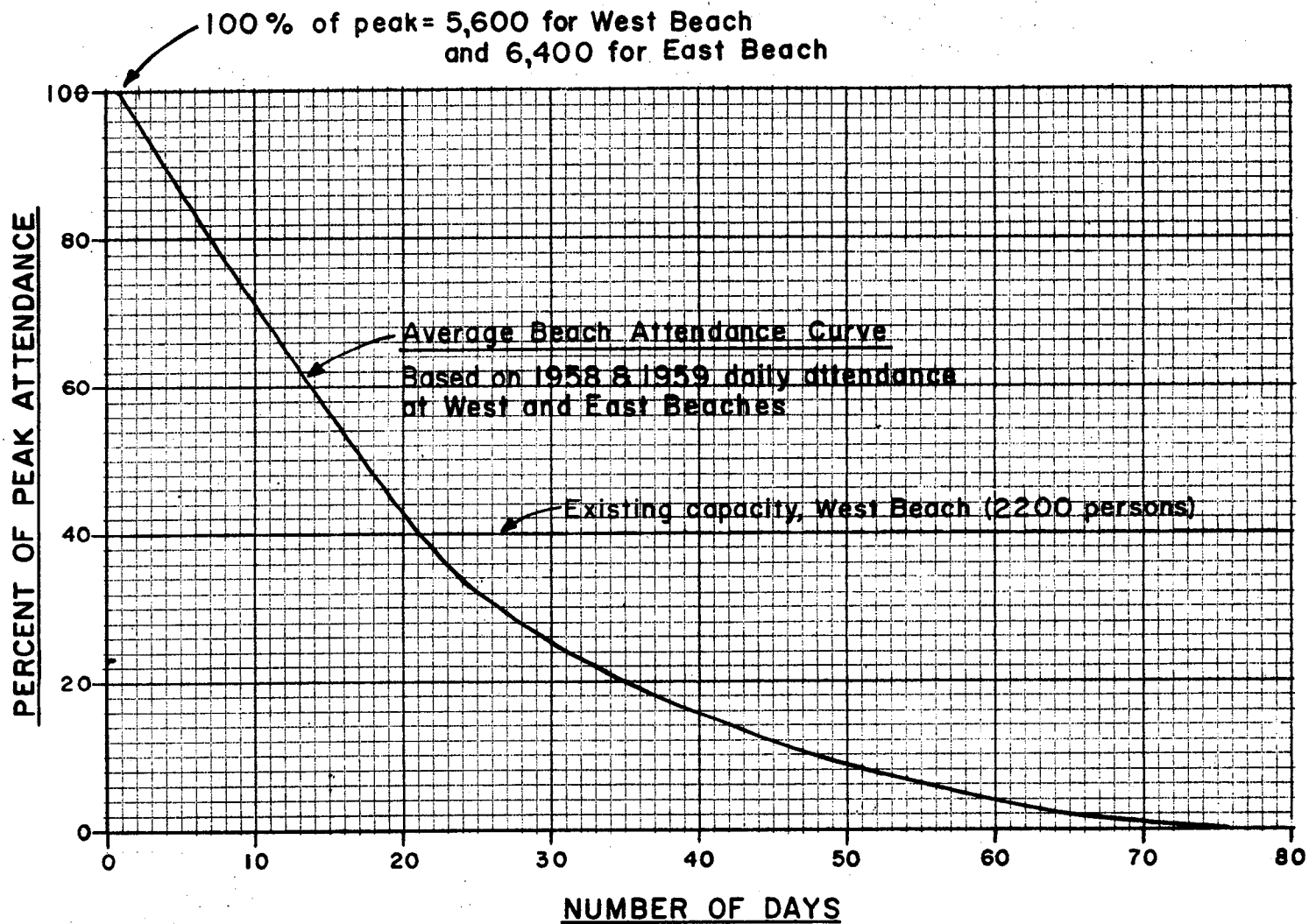
1. General. - The benefits from the protection and improvement of the public beach are based on the promotion and encouragement of the healthful recreation of the people and the prevention of direct damages to existing shore structures and the shore development. The United States does not own land in any of the areas for which detailed plans for protection and improvement have been developed; therefore, no Federal benefit will result from these plans. All benefits evaluated are non-Federal public benefits.

2. Rodney French Boulevard West Beach. - Either of the two plans considered will improve, enlarge and protect the public bathing beach and provide some protection for the existing shore development. The existing public beach area above the high water line is, approximately, 83,000 square feet. At a desirable space standard of 75 square feet per person, the beach can accommodate 1,100 persons at one time. Assuming a daily turnover of 2.0, the daily beach capacity is 2,200 persons. The experienced distribution of beach attendance was determined from daily records at Rodney French Boulevard West and East Beaches during 1958 and 1959 and it is shown graphically in Figure F-1. The peak daily attendance at West Beach was 5,600 persons, which is in excess of the daily capacity of the existing beach. The beach area above high water will be increased approximately 102,000 square feet by the Groin Extension Plan and 80,000 square feet by the New Groin Plan. At 75 square feet per person and a daily turnover of 2.0 the daily capacity of the added beach area will be about 2,700 persons for the Groin Extension Plan and 2,100 persons for the New Groin Plan, making a total daily beach capacity of 4,900 and 4,300 persons, respectively. The added beach space will be needed only when attendance exceeds the capacity of the existing beach area. From Figure F-1 it is determined that the added space is needed during 21 days of the season ( $2200/5600 = .393$ , or 40% of peak attendance). Overcrowding of the beach appears to be due to the smallness of the available beach area, the location of the two bathhouses at this side of Clark Point, and preferential use by nearby residents. The benefit to be derived is computed below, based on improvement of the standards of beach space, by reduction of overcrowding:

# Recreational Benefit Evaluation from Reduction of Overcrowding

|   | Groin Extension Plan  | New Groin Plan  |
|---|---|---|
| Number of days per season when existing beach capacity is exceeded  | 21<br>(From Fig.F-1 at $\frac{2200}{5600} \times 100$ or 40% of peak attendance)  | 21<br>(From Fig.F-1 at $\frac{2200}{5600} \times 100$ or 40% of peak attendance)  |
| Number of days when proposed beach capacity will be equaled or exceeded   | 5<br>(From Fig.F-1 at $\frac{4900}{5600} \times 100$ or 87.5% of peak attendance) | 8<br>(From Fig.F-1 at $\frac{4300}{5600} \times 100$ or 76.8% of peak attendance) |
| Capacity of added beach space   | 2,700   | 2,100   |
| No. of uses of added beach space  | $\frac{(21-5) 2700}{2} + 5 (2700)$<br>= 35,100                                    | $\frac{(21-8 (2100))}{2} + 8 (2100)$<br>= 30,450                                  |
| Annual monetary benefit   | $35,100 \times \$0.75 =$<br>\$26,325  | $30,450 \times \$0.75 =$<br>\$22,840  |
| Equivalent average value of benefit per person per beach use during period when existing beach capacity is exceeded | $\frac{\$26,325}{21 (5600 + 2200) / 2}$<br>= \$0.32                               | $\frac{\$22,840}{21 (5600 + 2200) / 2}$<br>= \$0.28                               |

No records of monetary damages to existing shore structures or the shore development are available. It is known from inspections after storms and from discussion with informed city officials that damages have occurred repeatedly. Such damages consist of undermining and buckling of the sea wall, loss of backfill, destruction of walks and washing or blowing of sand over the wall onto the boulevard. In the absence of actual damage records, it is estimated that average annual direct damages of this type which will be prevented by the proposed projects amount to \$500 per year.



**FIG. F-1. BEACH ATTENDANCE DISTRIBUTION  
CLARK POINT, NEW BEDFORD, MASS.**

The proposed construction, extension or enlargement of groins will reduce the annual losses of beach fill. Past replacement of these losses by the City of New Bedford has been reported as 22,000 cubic yards per year. It is estimated that losses will be reduced 50 per cent, resulting in a reduction of maintenance of 11,000 cubic yards per year. The annual benefit is estimated as the required annual cost of replacement equal to 11,000 x \$1.10 or \$12,100. Total annual benefits are summarized below:

| <u>Benefit</u>                 | <u>Groin Extension<br/>Plan</u> | <u>New Groin<br/>Plan</u> |
|--------------------------------|---------------------------------|---------------------------|
| Recreational                   | \$26,325                        | \$22,840                  |
| Direct damages prevented       | 500                             | 500                       |
| Reduction of beach fill losses | <u>12,100</u>                   | <u>12,100</u>             |
| Total . . . .                  | \$38,925                        | \$35,440                  |

3. Rodney French Boulevard East Beach. - The proposed fill and groins will provide additional public bathing beach area north of the presently developed East Beach. Protection of the shore in this area has been provided by stone revetment. The proposed project will provide, therefore, only minor protection benefits which cannot be evaluated. The principal benefits that could result would be from recreational use. The existing public bathing beach area of the presently improved East Beach is approximately 334,000 square feet or about four times that at the West Beach. At a desirable space standard of 75 square feet per person and a daily turnover of 2.0, the existing beach has a daily capacity of 8,900 persons. The reported actual peak daily attendance during 1959 was 6,400 persons which is less than the present beach capacity. The lack of overcrowding is probably largely due to the large beach area available. On the basis of actual use, no recreational benefits can be evaluated.

APPENDIX G

REPORT OF THE UNITED STATES FISH AND  
WILDLIFE SERVICE

**UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
BUREAU OF SPORT FISHERIES AND WILDLIFE  
59 TEMPLE PLACE  
BOSTON, MASSACHUSETTS**



**ADDRESS ONLY THE  
REGIONAL DIRECTOR**

**NORTHEAST REGION**

**(REGION 5)**

**MAINE  
NEW HAMPSHIRE  
NEW YORK  
VERMONT  
PENNSYLVANIA  
MASSACHUSETTS  
NEW JERSEY  
RHODE ISLAND  
DELAWARE  
CONNECTICUT  
WEST VIRGINIA**

December 5, 1960

Division Engineer  
New England Division  
U. S. Army, Corps of Engineers  
424 Trapelo Road  
Waltham 54, Massachusetts

Dear Sir:

This letter constitutes our report on your beach erosion control study of the shore of Clark Point in New Bedford, Massachusetts.

Your plans considered are as follows:

a. Rodney French Boulevard West Beach. Widen approximately 1,650 feet of beach south from Dudley Street to a minimum 60-foot width by direct placement of sand fill and lengthen 3 existing groins.

b. Rodney French Boulevard East Beach. Widen approximately 950 feet of beach by widening to a minimum 150-foot width by direct placement of sand fill and construct 2 impermeable groins.

c. Construct stone mounds or place stone revetments along the shore generally in lieu of or in front of existing walls to provide additional protection along the west side of Clark Point outside the proposed fill area or along the shore of Fort Rodman, wherever needed.

It is our understanding that sand fill material for the beach widening will be obtained from inland borrow pits. There is a possibility that the fill will be obtained by hydraulic dredging in deep water in Clark Cove or New Bedford Harbor.

Insofar as this Bureau can determine there would be no adverse effects on the fish and wildlife resources of the area as a result of the actual placement of sand fill material on the beaches, the obtaining of the sand fill from inland borrow pits, and the construction and extension of groins.

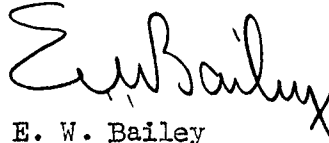
The obtaining of fill by hydraulic dredging instead of from inland borrow pits would have no adverse effects on fish and wildlife resources as it is limited to deep water in Clark Cove or New Bedford Harbor.

There is opportunity for improvement of conditions for land-based fishermen in line with project improvements by placement of rock-fill on the groins to permit easy and safe access for the public. Capping the top of the groins or smoothing the riprapping on the surface would provide this improvement.

The Massachusetts Division of Fisheries and Game concurs with this report.

The opportunity to report on this project is much appreciated.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "E. W. Bailey". The signature is written in dark ink and is positioned above the printed name and title.

E. W. Bailey  
Acting Regional Director





ADDRESS ONLY THE  
REGIONAL DIRECTOR

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
BUREAU OF SPORT FISHERIES AND WILDLIFE  
59 TEMPLE PLACE  
BOSTON, MASSACHUSETTS

February 9, 1961

NORTHEAST REGION

(REGION 5)

MAINE  
NEW HAMPSHIRE  
NEW YORK  
VERMONT  
PENNSYLVANIA  
MASSACHUSETTS  
NEW JERSEY  
RHODE ISLAND  
DELAWARE  
CONNECTICUT  
WEST VIRGINIA

Division Engineer  
New England Division  
U. S. Corps of Engineers  
424 Trapelo Road  
Waltham 54, Massachusetts

Dear Sir:

We have received a description from your office of alternate proposals for beach erosion control at Clark Point, New Bedford, Mass.

Our understanding is that under alternate plan #1, only two of the groins off Rodney French Boulevard West Beach would be lengthened, and the beach fill would be widened from 60 feet to 100 feet. The proposed groins off Rodney French Boulevard East Beach would be shortened and the beach fill would be 100 feet wide instead of 150 feet.

Under alternate plan #2, the existing groins would not be lengthened but three new groins 340, 350 and 375 feet in length would be built, alternating with the existing groins. Again the beach fill would be widened to 100 feet. Construction in the Rodney French Boulevard East Beach area would be the same as in alternate plan #1.

In cooperation with the Massachusetts Division of Fisheries and Game and the Massachusetts Division of Marine Fisheries, we have considered these modifications and can see no reason why they should alter the conclusions expressed in our report of December 5, 1960.

Sincerely yours,

M. A. Marston  
Acting Regional Director

## APPENDIX H

### Beach Erosion Control Report on Cooperative Study of Clark Point, New Bedford, Massachusetts

Information called for by Senate Resolution 148, 85th Congress,  
adopted 28 January 1958.

1. Beach Erosion Problems. - The study covers the shore of both sides of Clark Point, New Bedford, Massachusetts between Woodlawn and Apponagansett Streets. The principal problem consists of the rapid erosion of fill from the city beach at the west side of Clark Point and the difficulty experienced in maintaining an adequate width of beach for protection and recreational use. The problem consists also of undermining of sea walls and loss of backfill, storm damages to walls and bordering walks and overtopping of walls by water, sand, and debris. The shore is exposed to wave attack from southerly directions across Buzzards Bay. The mean range of tide is 3.7 feet and the highest tide of record is 14.2 feet above mean low water.

2. Improvements Considered. - Plans were considered for protection and improvement of city beaches as described below.

a. Rodney French Boulevard West Beach. Alternate 1, Groin Extension Plan. - Protecting and improving approximately 1,600 feet of beach south from Dudley Street by widening to a minimum 100-foot width by direct placement of sand fill, raising the inshore end of the existing groin at Dudley Street and lengthening the two existing groins at and south of Valentine Street 250 and 85 feet, respectively.

b. Rodney French Boulevard West Beach. Alternate 2, New Groin Plan. - Protecting and improving approximately 1,600 feet of beach south from Dudley Street by widening to a minimum 100-foot width by direct placement of sand fill, raising the inshore end of the existing groin at Dudley Street and construction of three new impermeable groins 350, 340, and 375 feet long.

c. Rodney French Boulevard East Beach. - Protecting and improving approximately 950 feet of beach south from Apponagansett Street by widening to a minimum 100-foot width by direct placement of sand fill and construction of two impermeable groins 335 and 445 feet long.

3. Improvements Recommended. - The two alternate projects at Rodney French Boulevard West Beach were found eligible for Federal aid

under the policy established by Public Law 826, 84th Congress and it was recommended that the United States adopt a project authorizing Federal participation in the first cost of construction of either one of the projects. The project at Rodney ~~French~~ Boulevard East Beach was recommended for consideration by local interests. Federal participation was not recommended for this project since the existence of adequate protective works and recreational beach area would not permit evaluation of any benefits for economic justification. Estimated first costs, annual charges, annual benefits and the benefit-cost ratio are tabulated below. The costs and benefits are based on January 1961 price levels, a 50-year economic life of projects, a 2.625 per cent interest rate for Federal investments and 3.5 per cent for non-Federal investments.

| <u>Project</u>                          | <u>Estimated<br/>First Costs</u> | <u>Estimated<br/>Annual Charges</u> | <u>Estimated<br/>Annual Benefits</u> | <u>Benefit-<br/>Cost<br/>Ratio</u> |
|---|----------------------------------|-------------------------------------|--------------------------------------|------------------------------------|
| Rodney French Boulevard<br>West Beach   |                                  |                                     |                                      |                                    |
| a. Alternate 1. Groin<br>Extension Plan | \$180,000                        | \$20,200                            | \$38,925                             | 1.93                               |
| b. Alternate 2. New<br>Groin Plan       | 126,000                          | 18,500                              | 35,440                               | 1.92                               |

4. Apportionment of Costs and Local Cooperation. - The estimated costs were apportioned in accordance with the policy established by Public Law 826, 84th Congress, which provides for Federal participation not to exceed one-third the construction costs for non-Federal publicly owned shores. Periodic replacement of beach fill losses is regarded as being maintenance and, therefore, not eligible for Federal aid. The Federal participation equals one-third the estimated first cost of construction amounting to \$60,000 for the Groin Extension Plan or \$42,000 for the New Groin Plan. The Federal participation is recommended subject to the conditions that local interests will:

a. Obtain approval by the Chief of Engineers, prior to commencement of work, of detailed plans and specifications for the project and of arrangements for prosecuting the work.

b. Assure continued public ownership of the shore and its administration for public use during the economic life of the project.

c. Assure maintenance and repair during the economic life of the works as may be required to serve the intended purpose.

d. Assure that water pollution that would endanger the health of bathers will not be permitted.

5. Discussion. - Analysis on the basis of an economic life of 100 years would not result in modification of the findings in the report. The benefit-cost ratios would increase from 1.93 to 2.06 for the Groin Extension Plan and from 1.92 to 2.01 for the New Groin Plan.



